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History of False Claims of the Bell Company

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By the grace of the Supreme Court of the United States, the Bell company had a monopoly of the telephone business from 1876 to 1898, based upon Bell's patent of March 7, 1876.

The Bell company claimed the continuance of such monopoly upon the Berliner transmitter claim from 1891, the date of the issuance of the patent, although the claim was one of June 4, 1877. This claim has been denied by an United States court, after a vicious attempt of the Bell to support the claim.

The appeal to the Supreme Court is now pending.

Claim for the continuance of the telephone monopoly has further been made, by the Bell company, upon the Carty patents for multiple exchange. This claim has also been denied by an United States court.

From 1896 up until now, the Independent telephone people have beaten the Bell on its own ground, in the Middle and Western states.

The Bell is now relying upon its long distance service, and upon its claims for possible superior service on long distance, by use of the Pupin patents. These claims are as void and wrongful as were and are the Bell claim of 1876—the Berliner of 1877—and the Carty claim of later date.

We shall carefully review all these claims. The people must know the record of the Bell monopoly.

A clear knowledge of the wrong that the Supreme Court of the United States has committed against the people of the United States (when, by a divided court, the Bell was allowed a monopoly for the telephone business), can only be had by a careful review, from the beginning, of the art of transmission of speech by electricity

An idea of the method of transmission of speech by the use of electricity can only be had by closely observing the record of the knowledge that man has gained about the subtle force we call magnetism. A magnetic circuit composed of one part wire, and the other part the earth return; or one composed of two wires closed in a circuit, not using the earth directly; *may be disturbed by the cutting on and off therein of the original sources of exciting magnetic current.* This cutting on and off, so far as telephony is concerned, may be made by complete physical make and break as between electrodes, or a make and break as between electrodes in constant contact; the latter being called a variable resistance method, to distinguish it from the first method. As a matter of fact, magnetically considered, the physical make and break is just as much a method of variable resistance as is the make and break of electrodes in constant contact. *The reason why commercial telephony could not be had by Reis or Bell when the electrodes were not in constant contact, is that they did not have, or know of, any magnetic current of such quality that the gap presented by electrodes, not in constant contact, could be bridged.* The not observing this fundamental fact was the continuing error of the Supreme Court.

It is necessary now to note what men did know of magnetism and of charging circuits therewith up to the time of Bell's obtaining, from the Supreme Court of the United States, a warrant to monopolize the speech of mankind.

I now quote from the advance sheets of a work, I am finishing, upon the general subject of magnetism:

MAGNETISM.

1. An entity—the sum of all disturbances of all atoms.
2. Some expression of it, the only insulator for any other expression.
3. Heat and cold a mode of expression of magnetism.
4. All chemical changes are modes of expression of magnetism.
5. All electrical (so called) currents are modes of expression of magnetism.
6. All substances (aggregations of atoms) are modes of expression of magnetism.
7. All changes of non-living matter into living matter, and *vice versa* are modes of expression of magnetism.

The rays of the Sun (its lines of force), passing through inter-stellar space, without resistance (*for argument see Rogers' charts*), come within the atmosphere of the earth and to the earth.

All atoms (or the electron of Thompson, and so on to infinity) have individual motion or rotation, upon each its axis, "in response to a primarily sensient property which they universally possess." (*See Stephens, Varley, Hamilton, et al.*). (See Rogers' charts.)

Whenever these rays meet any substance their passage is resisted according to the character of the substance, and heat is developed.

Chemical changes occur, until by reason of affinities, different elements combine to resist further changes of like character, and thus forms of living and non-living matter are "created."

Against the constant disturbances of *total magnetism* the contest is continued; and, above and below all the ceasless change of the relation of the cells from the condition of non-living to that of living—and back again—(in different forms), eternally appears.

Thus we arrive where, arbitrarily naming the sum of all disturbances or energy of all atoms, we have the entity magnetism.

The total effect of the sun upon the planet called the earth is that the earth is kept in an orbit by the positive force of the sun.

Here we have the *great primary* and the *great secondary circuits of force—so far as man is concerned.*

The earth's individual yearly motion, and its individual daily motion, result in its having positive lines of force which control, in greater or less degree, the positive motion of the individual forms of matter which make up the earth and its atmosphere. (See the Earth Chart.)

The positive lines of force of any form of atoms being, at least for an instant, the primary of some secondary which, in turn, is a primary of some secondary, and this to infinity. (*This is visible in the action of magnets with reference to each other.*)

Up to now few modes of expression of magnetism have been distinctly observed by man. Long ago, in Mag-

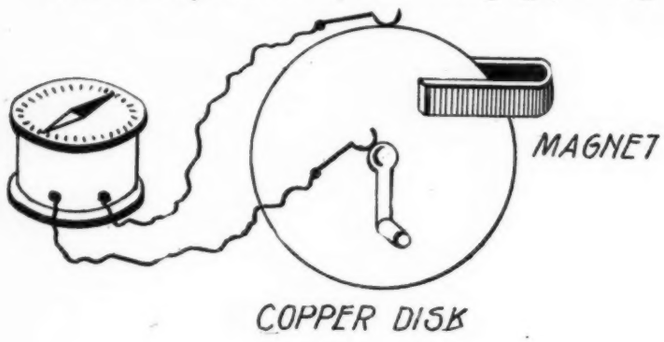


FIG. 1.

nesia it may be, man stumbled upon a thing he called a lodestone, and, fussing with it, he found that while it "attracted" many things, it certainly "attracted" the substance he called iron (he does not yet fully understand that the "attraction" is mutual; and it was all so curious and interesting that he renamed the lodestone as magnet and the force it expressed as magnetism.

Then he found that as a magnet attracted a piece of iron it left with the piece of iron more or less permanently the magnetic quality, and that if the iron was hard or in the shape of steel the magnetic quality was retained indefinitely.

Then he found that every piece of a magnet became a magnet; and so on until, one day, a *superb human magnet, one Michael Faraday, summed up all that man had thus far done with the magnetic current, and built a little "disk dynamo," and with it he discovered how to "in-*

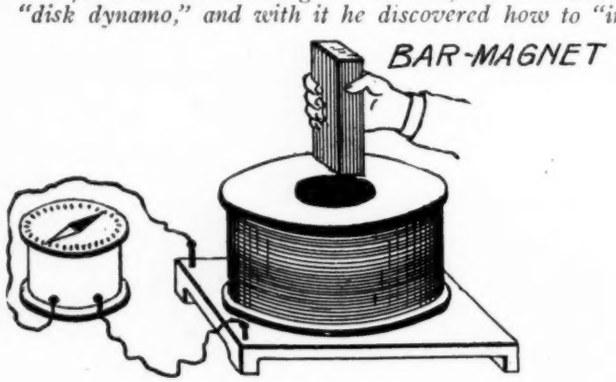


FIG. 2.

duce" the magnetic flow (expressed in impulses) around a neighboring circuit of copper wire (and thus established a magnetic circuit).

(Faraday—1831.) Faraday discovered that a current of "electricity" could be momentarily induced in a closed circuit by using outside power to turn a copper disk in and out of the flow of a magnet which was close to the disk. (Fig. 1.)

Or if a bar magnet was moved in and out of a coil of wire such momentary currents were induced in the coil. (Fig. 2.)

He followed this up by finding that a wire carrying a current had the same effect as a magnet. For a charged wire is a magnet. (Fig. 3.)

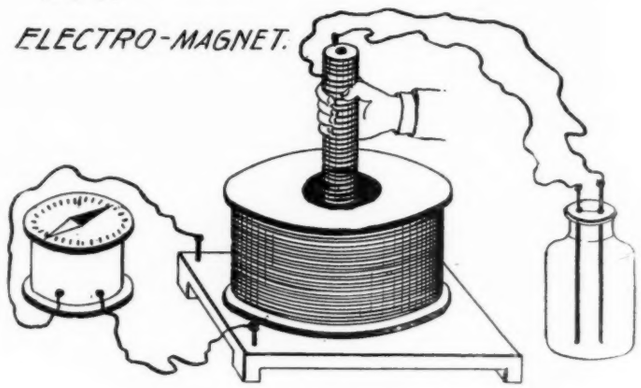


FIG. 3.

(Chart No. 9)—The fundamental law of current induction may be shown as follows, viz.:

Two long parallel copper wires—the ends of one connected with a battery—(the primary circuits), and the ends of the other with the binding posts of a galvanometer—(the secondary circuit). (Fig. 4.)

The instant the circuit is completed in the primary, a momentary current, in the opposite direction, observing the law of magnetization, is induced in the other wire, and is so shown by the deflection of the galvanometer needle. (Fig. 4.)

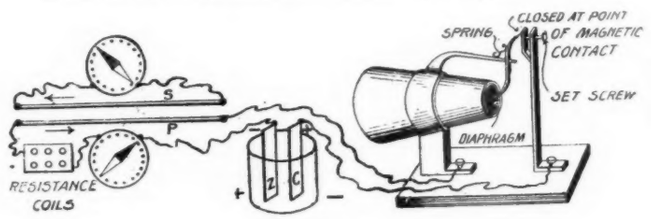


FIG. 4.

If now,—when the needle is at rest,—the primary circuit be broken, and the current in that circuit be stopped, another momentary current is indicated (by the galvanometer needle), in the secondary circuit—but in this case in the same direction as was the inducing current,—observing the law of magnetization. (Fig. 5.)

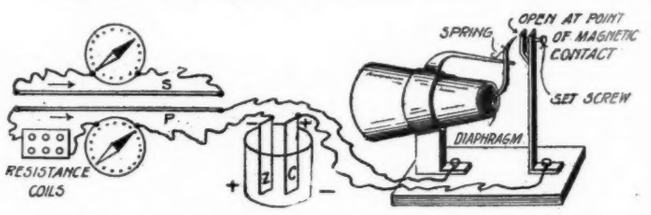


FIG. 5.

The passive condition of the secondary wire, under induction, was described by Faraday as electrotonic.—An electro throb, so to speak, marks the setting in of this state and another of its vanishing—the "make" impulse in the opposite direction to that of the inducing current;—and the "break" impulse in the same direction as that of the inducing current.

The REIS-LEGAT telephone of 1863 is shown in figures 4 and 5. Until a new quality of so-called electric current is discovered,—this telephone of REIS-LEGAT stands in the presence of knowledge and absolutely denies, from any and after 1863, any claim for monopoly of the TRANSMISSION OF SPEECH BY THE USE OF ELECTRICITY.

All that was left to discover (if one was confined to use of battery or Lenz Law currents) was better material (as carbon, by Edison),—or means to better keep the electrodes or terminals in constant contact—or better induction coils to better transform

the battery current in some definite length of circuit. All these must ever be the subject of only special claims or patents.

PRIMARY.	SECONDARY.
A current which *begins;*	induces an *"inverse"* momentary current in a neighboring circuit.
A current which *approaches;*	
A current which *increases in strength;*	induces a *"direct"* momentary current in a neighboring wire, or circuit.
A current which *stops;*	
A current which *retires;*	
A current which *decreases in strength;*	

"Inverse" is frequently read "negative."
"Direct" is frequently read "positive."

(EXTRA CURRENT)—Not only does the primary current induce a current in the secondary, but it acts inductively upon itself. When contact is broken in the primary circuit the "spark" is seen. When the wire is short, the spark is feeble, but it increases with the length of the circuit, and particularly when the wire is wound in a coil.

The inductions of the primary circuit or current upon the various parts of itself, exciting extra currents in the primary wire, is the cause of the brilliancy of the spark.

At the instant the primary current begins and ends, extra currents are induced by the action of the several parts of the circuit upon each other—that at the beginning ("making") of the circuit being "inverse," and that at the end ("breaking") being "direct."

As the extra current inverse acts opposite to the primary current, it does not appear as a separate current, but only retards the instant passage of the primary current.

The extra current direct succeeds the primary current, and therefore has a separate existence.—This *extra current direct* has a much *higher voltage* than *the original current.*

The *effect* of the *extra current* upon the *direct induced current of the secondary coil* is decidedly to *lessen* its *tension,* for since the rapidity of the magnetic change in the secondary is the thing desired, and this being dependent upon the *speed of "making"* and *"breaking"* of the *primary circuit, anything which* prolongs the cessation of the magnetism *of the core and of the current in the primary coil,* and thus *impairs* the *suddenness* of *this change,* reduces the tension of voltage of the induced current.

(A condenser is here used.)

(INDUCTION COIL)—As the preceding statements refer particularly to what is known as an induction coil (which has two coils of wire,—one, the primary circuit, being charged by (1) a battery, or (2) a dynamo current,—and the other, the secondary circuit, which is charged by the primary circuit being "made" and "broken"), before we consider the action of the condenser upon the "extra current" above referred to, and upon the tension of the induced current of the secondary coil, let us view the construction and action of the induction coil.

Figures 1, 2, 3, 4 and 5 are, broadly speaking, induction coils;—for in each drawing there is shown a secondary wire circuit actuated by the "making" and "breaking" of the primary circuit, no matter how that primary circuit is charged or established.

(See Chart No. 9) But more narrowly speaking, when we say "induction coil" we mean two coils of wire,—one, the primary, of few turns and of thick wire, its ends connected with its charging source, and the other, the secondary, of many turns and of thin wire (its ends closed in such a manner as to include the thing to be affected,—as, for instance, a telephone receiver or the human body), all well insulated and with a core of bar soft iron,—the last vastly increasing the effect over coils not having such a core.

Therefore, here are the main points about induction coils.

1. Soft iron or steel core—composed of a bundle of iron wires.
2. The longer and the finer the secondary wire, the greater the voltage—but this, under the Lenz Law, at the expense or transformation of volume or amperage.
3. The quantity of electricity transmitted by the "inverse" and "direct" current is the same; but where the fine wire and many turns is used for the secondary, the tension or voltage of the "inverse" and "direct" current is not the same—the "direct," having the highest tension, has more power to force its way along the wire of the secondary than has the "inverse."
4. The excitation of magnetism in the core of the primary coil being the principal aim—the wire is thick and of few turns.
5. The tension of the induced current in the secondary coil being alone aimed at—the wire is thin, with as many turns as may be well insulated, each from the other.
6. The total electro-motive force of the coil is the sum of that of all of the turns of the secondary—in the same way that the electro-motive force of the battery is proportionate to the number of the cells.

FARADAY'S LAW: "If any conducting circuit be placed in the magnetic field of a permanent magnet, or of any electric current, then, if by either a change or relative position or a change of strength of primary current, a change is made in the number of lines of force passing through the secondary, an electro-motive force is set up in the secondary proportional to the rate at which the number of included lines of force is varying."

Like most of Faraday's conclusions, this "law" remains *a law.*

(See Chart No. 9)—*But the Lenz Law,* which was framed upon Arago's experiments and Faraday's explanations of Arago's experiments—*is now "reread"* or *"evaded"—since there is now in existence a dynamo from the primary of which currents are induced in its secondary of a direction, and of such polarity, that their magnetism tends to accelerate the motion producing them.*

Whereas the Lenz Law admits of no exception.

LENZ' LAW: "In all cases of electro-magnetic induction, the induced current reacts upon the magnet circuit in such a manner as to tend to stop the motion producing it."

All the foregoing about current induction, primary and secondary currents, extra current, induction coil, etc.,—applies to the battery.

And here we must patiently view the mechanism and process of the battery.

For example:

Place pure zinc and pure copper in a glass vessel—3 parts filled with a 10 per cent solution of sulphuric acid. If the metals are not in contact—there is no practical change. If they touch, or are connected with a wire, the **Zinc** will slowly be dissolved by the acid, and bubbles of **Hydrogen** will appear at the surface of the copper plate, while a current of electricity will flow across or around the connecting wire.

By bringing the two metals into contact we establish a potential difference between them;—that is, we electrify one plate positively and the other negatively,—and as there is in all unequal distribution of forces an universal tendency towards equilibrium, an electric current passes from the plate of higher potential to that of the lower.

(This effort to restore equilibrium is had between two magnets when brought together or when in each other's vicinity—if proper poles are presented each to the other.)

This current flows from Z to C through the liquid,

and from C to Z around the wire.

Owing, however, to the chemical changes which accompany its passage through the liquid, a fresh potential difference is set up between the plates, which is again followed by an equilibrating flow, and this by further chemical change, and consequent potential difference,—and another equilibrating flow.

Thus that which is called a "continuous" current is really a succession of impulses, around the wire, which are infinitely varied in density, by the complex changes in amount and character of the plates, and the state and the amount of the liquid, and the effect of the induced current and the "extra" induced or reversed currents.

The sum of these changes cause polarization of the cell:

This phenomenon explained:

The acidulated water, in the presence of the electrified **Zinc** and **Copper** is decomposed into **Oxygen**—which unites with the zinc to form **Zinc Oxide,** which is further acted upon by the sulphuric acid to form **Zinc Sulphate. Hydrogen** is given off at the copper and collects upon it.

Polarization principally due to the accumulation of **Hydrogen** on the **Copper.**

This weakens the current in two ways:

(1) The film it forms converts the copper into a **Hydrogen** plate, and this being electro-positive to the **Zinc** and **Oxygen,** tends to set up a current in the reverse direction to the original one.
(2) The film on the copper offers a resistance to the original current.

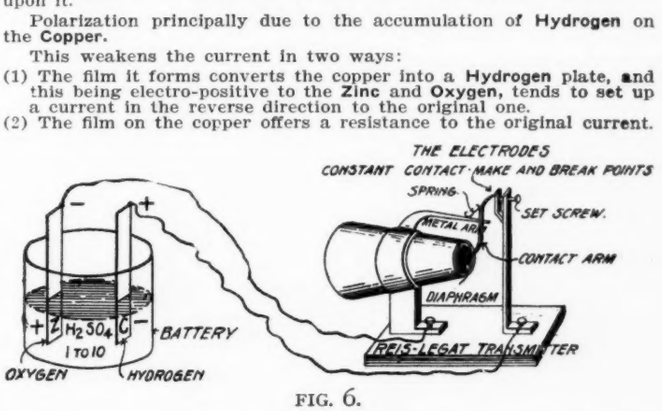


FIG. 6.

We show the "bringing of the metals into contact" by the connection in the Reis transmitter, at point of constant contact—make and break—therein. If the diaphragm was vibrated strongly—as by loud, explosive talking—then the spring was not strong enough to hold the constant *physical contact;* the electrodes were thrown physically apart, and so, the current not being of sufficient frequency to magnetize the circuit and bridge the gap, speech could not be had.

Even while the primary circuit is made, if resistance coils are switched in and out of the circuit, impulses will be induced in the secondary in accordance therewith—the putting in of resistance "breaking" the circuit and the taking out of the resistance "making" the circuit, all according to Faraday's Law.

"The vibrations of a transmitter diaphragm, communicated to electrodes in constant contact, operate exactly as to

inducing impulses in the secondary as does the putting in or taking out resistance as above described.

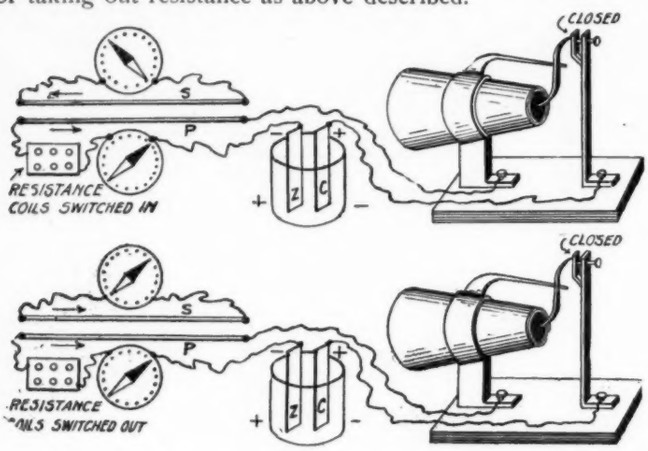


FIG. 7.

Impulse in secondary reverses in the direction in which the primary impulse has flown, and reacts upon the primary (according to the Lenz Law) when again (on immediate "make"), it flows.

This results in *inducing* in the coils *of the primary wires* a current, called the "extra current," or current due to the *counter electro-motive force of self induction;* and following the above laws of Faraday and Lenz, it *opposes and weakens the primary current* on closing and is *in the same direction and strengthens the primary current on opening.*

In telephony the transmitter diaphragm is simply placed against the electrodes (usually of carbon, for that material has the combination of resistance and conductance in the degree which makes it operate as a condenser, and properly store for a brief instant the "reacting" "extra current" and let it back with "make" impulse in the primary) that, when vibrated by speech, it may directly and mechanically communicate to the electrodes the varying pressure caused by said vibrations, and thus "make" and "break" the circuit in accordance with the sound waves.

Then according to the above laws of Faraday and Lenz, the secondary circuit is established in the manner above described, and at the same time "made" and "broken" by the action of the magnet and the receiving diaphragm (its armature), and thus more or less perfectly speech is transmitted.

All this knowledge was open to any one from about 1800 (the date of voltaic pile), to 1875 (the date of Bell's pretended discovery).

Arago had made his discovery in 1824-5. Faraday had read Arago's discovery, and built his own disk dynamo in 1831.

Shortly thereafter Faraday had stated his law (above quoted), and had also stated other law (among which is his "2d Law")—all of which, with Lenz's Law, had then fixed, and now fixes, the limitations of the use of so-called electricity in the matter of speech transmission, *unless, as hereinbefore said, an entirely new quality of current is discovered and applied.*

We shall herein soon see that Bell knew this and attempted to get a new quality of current. He absolutely failed. *His pretended speech instrument did not work—never has worked—and never will work. And yet the Supreme Court gave him and his creatures a monopoly of the speech of the world thereon, and on the false claims that he had discovered the use of electricity in the matter of the transmission of speech.*

In view of the foregoing laws and the conceded application thereof, we shall now see the course of true discovery in telephony.

126 U. S., page 30:

"The Bourseul publication (there were several in the records), chiefly cited in argument, was the original communication from M. Charles Bourseul printed in Volume XXIV. of 'L'Illustration,' Paris, August 25, 1854, of which the following is a translation:

"The electric telegraph is based on the following principle: An electric current, passing through a metallic wire, circulates through a coil around a piece of soft iron which it converts into a magnet. The moment the current stops, the piece of iron ceases to be a magnet. This magnet, which takes the name of electro-magnet, can thus in turn attract and then release a movable plate (**plaque mobile**) which by its to-and-fro movement produces the conventional signals employed in telegraphy. Sometimes this movement is directly utilized, and is made to produce dots or dashes on a strip of paper which is drawn along by clockwork. The conventional signals are thus formed by a combination of those dots and dashes. This is the American telegraph, which bears the name of Morse, its inventor. Sometimes this to-and-fro movement is converted into a movement of rotation. In that way we have either the dial telegraph used on railroads, or the telegraph used in the government system, which by means of two line-wires and two indicating needles, reproduce all the signals of the aerial telegraph or semaphore which was formerly used. Suppose, now, that we arrange upon a movable horizontal circle letters, figures, signs of punctuation, etc. One can understand that the principle we have stated can be used to choose at a distance such and such a character, and to determine its movement, and consequently to print it on a sheet of paper appropriately placed for this purpose. This is the printing telegraph.

"We have gone still further. By the employment of the same principle, and by means of a mechanism rather complicated, it has been possible to reach a result which at first would seem to be almost a miracle. Handwriting itself is produced at a distance, and not only handwriting, but any line or any curve; so that, being in Paris, you can draw a profile by ordinary means there, and the same profile draws itself at the same time at Frankfort. Attempts of this sort have succeeded. The apparatus has been exhibited at the London Exhibition. Some details, however, remain to be perfected. It would seem impossible to go beyond this in the region of the marvelous. Let us try, nevertheless, to go a few steps further. I have asked myself, for example, if the spoken word itself could not be transmitted by electricity; in a word, if what is spoken in Vienna may not be heard in Paris? The thing is practicable in this way:

"We know that sounds are made by vibrations, and are made sensible to the ear by the same vibrations, which are reproduced in the intervening medium. But the intensity of the vibrations diminishes very rapidly with the distance; so that even with the aid of speaking tubes and trumpets, it is impossible to exceed somewhat narrow limits. Suppose that a man speaks near a movable disk, sufficiently flexible to lose none of the vibrations of the voice; **that this disk alternately makes and breaks the connection with a battery;** you may have at a distance another disk which will simultaneously execute the same vibrations.

"It is true that the intensity of the sounds produced will be variable at the point of departure, at which the disk vibrates by means of the voice, and constant at the point of arrival, where it vibrates by means of electricity; but it has been shown that this does not change the sounds. It is, moreover, evident that the sounds will be reproduced at the same pitch.

"The present state of acoustic science does not permit us to declare **a priori** if this will be precisely the case with syllables uttered by the human voice. The mode in which these syllables are produced has not yet been sufficiently investigated. It is true that we know that some are uttered by the teeth, others by the lips, etc.; but that is all.

"However this may be, **observe that the syllables can only reproduce upon the sense of hearing the vibrations of the intervening medium.** Reproduce precisely these vibrations and you will reproduce precisely these syllables.

"It is, at all events, impossible, in the present condition of science, to prove the impossibility of transmitting sound by electricity. Everything tends to show, on the contrary, that there is such a possibility. When the application of electro-magnetism to the transmission of messages was first discussed, a man of great scientific attainments treated the idea as Utopian, and yet there is now direct communication between London and Vienna by means of a simple wire. Men declared it to be impossible, but it is done.

"It need not be said that numerous applications of the highest importance will immediately arise from the transmission of speech by electricity. Any one who is not deaf and dumb may use this mode of transmission, **which would require no apparatus except an electric battery, two vibrating disks and a wire.** In many cases, as, for example, in large establishments, orders might be transmitted in this way, although transmission in this way will not be used while it is necessary to transmit letter by letter, and to make use of telegraphs which require use and apprenticeship. However this may be, it is certain that in a more or less distant future, speech will be transmitted by electricity. I have made some experiments in this direction. They are delicate and demand time and patience; but the approximations obtained promise a favorable result.

"Paris, August 18, 1854. "CHARLES BOURSEUL."

Here it will be seen that not only was the telegraph described, but the recording of the telegraph message; also the aerial telegraph, or semaphore; also the printing telegraph; also transmission of handwriting by electricity; and then he asks the direct question with regard to telephony, and says:

"We know that sounds are made by vibrations, and are made sensible to the ear by the same vibrations, which are reproduced by the intervening medium; but the intensity of the vibration diminishes very rapidly with the distance, so that, even with the aid of the speaking tubes and trumpets, it is impossible to exceed somewhat narrow limits. **Suppose that a man speaks near a movable disk, sufficiently flexible to lose none of the vibrations of the voice; that this disk alternately makes and breaks the connection with a battery; you may have at a distance another disk which will simultaneously execute the same vibrations."**

It is seen that the transmitter disk or diaphragm of Reis when spoken against must alternately "make" and "break" the battery circuit, according to the vibrations caused by the voice variations. It mattered not that violent speaking caused a variation of resistance to the point of physical

separation of the terminals or electrodes. The method was proven. The "make and break" that Bourseul speaks of was a magneto one and regardless of whether it was between terminals in constant physical contact or not.

Subsequent events have proven that this declaration is fully complete as to *method of speech transmission by electricity.* There remained only the making of a mechanical transmitter and the making of a mechanical receiver, and then placing same in a charged or magnetized electrical circuit.

A very important hint in this regard is given, when he says:

"It is true that the intensity of the sounds produced will be variable, at the point of departure (at which the disk vibrates by means of the voice), and constant at the point of arrival (where it vibrates by means of electricity); but it has been shown that this does not change the sounds. It is, moreover, evident that the sounds will be reproduced at the same pitch."

Here he clearly announces that the make and break of an electric circuit is entirely mechanical; or, in other words, the actuation of the transmitter is entirely by the human voice, but at the receiver the actuation is by "means of electricity," and that "this does not change the sounds." Then he further observes, " . . . that the syllables can only reproduce upon the sense of hearing the vibrations of the intervening medium. Reproduce precisely these vibrations, and you will reproduce precisely these syllables."

The "intervening medium" was then, and now is, known to be a combination of the magnetization of the wire and the induced magnetization of the surrounding air—with the magnetization of the earth as an added factor when the wire was "grounded."

And further he says that "This mode of transmission . . . requires no apparatus except an electric battery, two vibrating disks, and a wire."

The "mode of speech transmission" to-day requires no other elements than "an electric battery, two vibrating disks, and a wire." The character of the disks—of the coils to transform the battery current to suit the distance of the circuit—are the subjects of special patents—not of a basic patent for a method.

So far as foreclosing the broad claim for transmission of speech by electricity is concerned, after this publication all that was necessary for any one then to do was to take the disk (transmitter diaphragm), connect it to electrodes in better magnetic constant contact *(because there was then no current of sufficient potentiality, or high frequency, to magnetize a circuit in which the electrodes were not in constant physical contact),* and a receiver disk (receiver diaphragm) in magnetic contact with the poles of an electromagnet or permanent magnet, and both the transmitter apparatus and the receiver apparatus in one circuit. In the then state of the art, and in the now state of the art, coils would be and are necessary in order to transform the current at the receiver (as a result of the make and break of the circuit at the transmitter), *so that a greater length of line may be charged or magnetized.*

This is not all that Bourseul has told us:

From Du Moncel's "Telephone, Microphone, and Phonograph," page 13.

1854—"Charles Bourseul first described the process by which the vibrations of the human voice in speech might be expressed in variations of resistance of the electric current;"—

"The increase of pressure between the two electrodes in constant contact produces a diminution in their electric resistance."

Reis knew of this, and so had a spring and a set screw to keep the electrodes in constant contact. Bell probably knew of this, and sought in his 1876 patent to operate with the electrodes only magnetically in contact. Both failed of commercial operation. Reis's method (not Bell's) is the method and art of to-day. Carbon electrodes were necessary. Bell got them of Edison.

Since the whole object in telephoning is to convey the vibrations of a transmitter diaphragm actuated by the human voice, to a receiver diaphragm actuated by the impulses of the electric current (the result of the making and breaking of the circuit by the action of the transmitter diaphragm); then the main thing to have been done, after Bourseul's publication, was to get the best material for electrodes (special patents), and to construct the best induction coil, and put the transmitter in the primary and the receiver in the secondary.

Bear in mind that it was not until about 1878 that the use of carbon as an electrode was understood; and that even now, the reason it operates as it does in connection with the use of the induction coil in the circuit, is by the experts not at all understood. Also remember, all the while, that any "making" or "breaking" of any primary electric circuit (whether by change of pressure between terminals in constant contact, or by complete physical separation and bringing together again) induces in any other circuit (its secondary) a current whose impulses on the "make" of the primary are in contrary direction to the primary, and on the "break" are in the same direction as the primary.

(The words "contrary direction" and "same direction" are not even descriptive of the fact, but are used here because they have come to have a general meaning.)

Before the Supreme Court of the United States, in these cases, there was complete evidence of the work and publications of Professor Johann Philipp Reis of Friedrichsdorp, Germany, showing that he had a complete system:

(EWING): "Not an important feature of the telephone of to-day was lacking in his system.

"A vocal chamber;

"A vibrating diaphragm carrying one electrode;

"Another electrode supported in constant contact with the other electrode, with a spring;

"And the electro-magnet at the receiver, actuated by a broad, thin strip, which repeated the vibration of the transmitting diaphragm and reproduced the spoken words."

(PROF. S. P. THOMPSON): "There is not a telephone in the exchanges of England to-day in which the fundamental principles of Reis' telephone are not the essential and indispensable features."

Dr. Channing, in reviewing Prof. Thompson's "A history of the telephone of J. P. Reis," says that it is incontestably demonstrated by citations from Reis' lectures and papers on his telephone, that he relied on *continuous undulatory currents* as indispensable to success in transmitting speech.

*(CHANNING): "The contact pieces of his transmitters,—one or both, were mounted with adjustable springs, or held together by gravity so as to vary the current without completely breaking the contact, in the same way and for the same purpose as in the Berliner and Blake transmitters. Too loud shouting in either the Reis or Blake transmitters spoils the articulation by breaking the circuit. * * * If the Berliner and Blake transmitters determine undulatory currents in correspondence with sound waves—by their current regulators—the Reis transmitters, by the same mechanism, necessarily do the same."*

It must be understood that any change in the relations of the terminals (and the electrodes of any telephone system are terminals) of an electric circuit produces or induces in that circuit's secondary, a current whose impulses are in two directions, viz.: when the change in the primary is a "making" of its circuit, then the induced impulse in the secondary is in a contrary direction to that of the primary current, and when the change in the primary is a "breaking" of the circuit, then the induced impulse in the secondary is in the same direction as that of the primary circuit; *and that the frequency of the impulses in the secondary is much higher than in primary, and especially so when the induction coil has very fine wire in its secondary.*

The terminals may be of metal or any material that, to infinity, may conduct the current of any permanent magnet with its armature; or an electro magnet with its armature.

Now, remember also, that in Reis's telephone system (and in every other system yet commercially used) the transmitter is in the primary circuit, and that the electrodes thereof are varied, in constant contact, by the vibrations of the diaphragm when spoken against. The diaphragm may be one of the electrodes (and usually is so) but it is not required that it should be so—for the office of the diaphragm is to mechanically vibrate against an electrode in constant contact with another electrode and thus vary the resistance of the circuit; and that the receiver is in the secondary circuit; its diaphragm being of metal (preferably of soft steel) and is at the same time the keeper bar or armature of the electromagnet, or the permanent magnet.

Reis says:

"From the preceding it follows:

"First. Every tone (Ton) and every combination of tones, on

striking our ear, causes vibrations on the drum of the ear, the succession of which may be represented by a curve.

"**Second.** The succession of these vibrations alone gives us a conception (sensation) of the tone, and every alteration changes the conception (sensation).

"As soon, then, as it is possible to produce, anywhere and in any manner, vibrations whose curves shall be the same as those of any given tone or combination of tones, we shall receive the same impression as that tone or combination of tones would have produced on us.

"With the above principles as a foundation, I have succeeded in constructing an apparatus with which I am enabled to reproduce the tones of various instruments, and even to a certain extent the human voice. It is very simple, and by means of the figure will be easily understood from the following explanation:

"In the cubical block of wood **r s t u v w x** there is a conical perforation **a**, closed at one end by a membrane **b** (pig's intestine), upon the middle of which there is cemented a conducting strip of platinum; this is connected with the binding screw **p** (auf deren Mitte ein stromleitendes Streifchen Platin, festgekittet ist. Dieses steht mit der Klemme **p** in Verbindung). From the binding screw **n**, another thin strip of metal (ein dunnes Metallstreifchen) extends over the middle of the membrane, and ends here in a platinum wire placed at right angles to its length and surface.

"From the binding screw **p**, a conducting wire runs through the battery to a distant station, being connected with a coil of silk-covered copper wire, and this again is connected with a conductor leading back to the binding screw **n**.

"**Coil 7 inches long, 6 layers of fine wire—knitting needle core projecting 2 inches at both ends.** By means of the projecting ends the coil rests upon two bridges of a resonant case. All this can be replaced by any other apparatus producing galvanic tones." (Fig 8.)

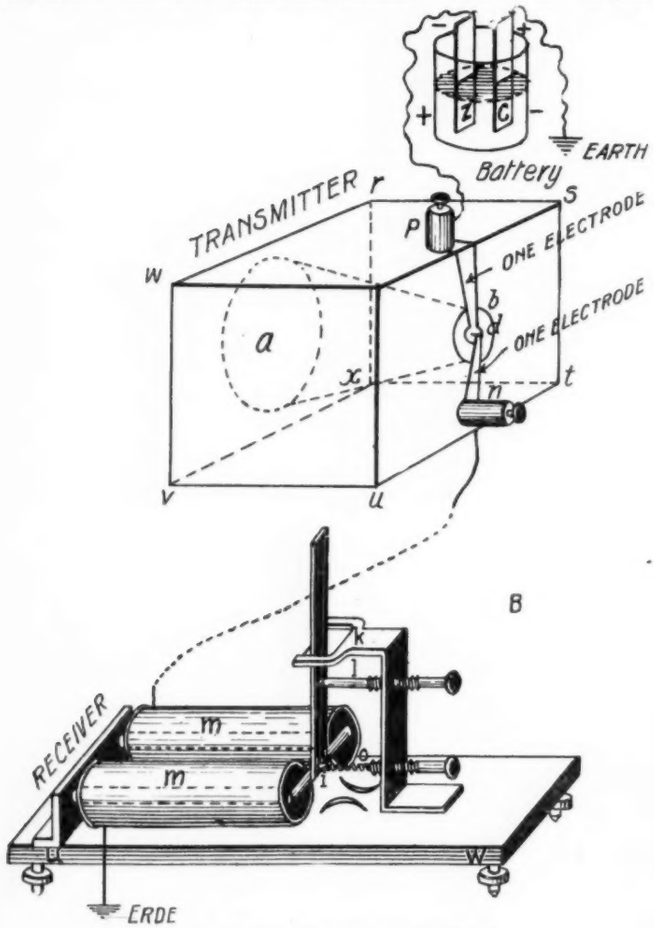


FIG. 8—REIS' FIRST TELEPHONE.

In the paper describing it, Reis says:

"With the above principles as a foundation, I have succeeded in constructing an apparatus with which I am enabled to reproduce the tones of various instruments, and even to a certain extent the human voice."

"Hitherto it has not been possible to reproduce the tones of human speech with a distinctness sufficient for every one. The consonants are for the most part reproduced pretty distinctly, but the voweis as yet not in an equal degree."

"The coil at the distant station is about six inches long, is composed of six layers of fine wire, and, as a core in its center, has a knitting-needle which projects about two inches at both ends. By means of the projecting ends, the coil rests upon two bridges of a resonant case. (All this part can, of course, be replaced by any other apparatus by means of which the well known "galvanic tones" can be produced.)

"If now tones or combinations of tones are produced in the neighborhood of the block, so that sufficiently powerful waves enter the opening **a**, then these sounds cause the membrane **b** to vibrate. At the first condensation the hammer-like wire **d** is pushed back; at the rarefaction it cannot follow the retreating membrane, and the current traversing the strips remains broken (Strom bleibt so lange unterbrochen bis, etc.), until the membrane forced by a new condensation again presses the strip (proceeding from **p**, against **d**. In this way each sound wave causes a breaking and closing (ein Oeffnen und ein Schliessen) of the current (Stromes).

"At each closing (Schliessen) of the circuit (Kette), the atoms of the iron wire inside the distant spiral are moved away from each other (Pouillet Müller, p. 304, Vol. II., fifth edition); on breaking the circuit (beim Unterbrechen des Stromes), these atoms seek to regain their position of equilibrium. When this happens, in consequence of the reciprocal actions of elasticity and inertia, a number of vibrations are produced and they give the longitudinal sound of the rod (see as above). This is the case if the making and breaking of the current (Unterbrechungen und Schliessungen des Stromes) occur with comparative slowness. If they occur more rapidly than the oscillations of the iron core, due to its elasticity, the atoms cannot complete their course. The paths described become shorter in proportion as the interruptions are more frequent, but then are just as numerous as these." (Fig. 9.)

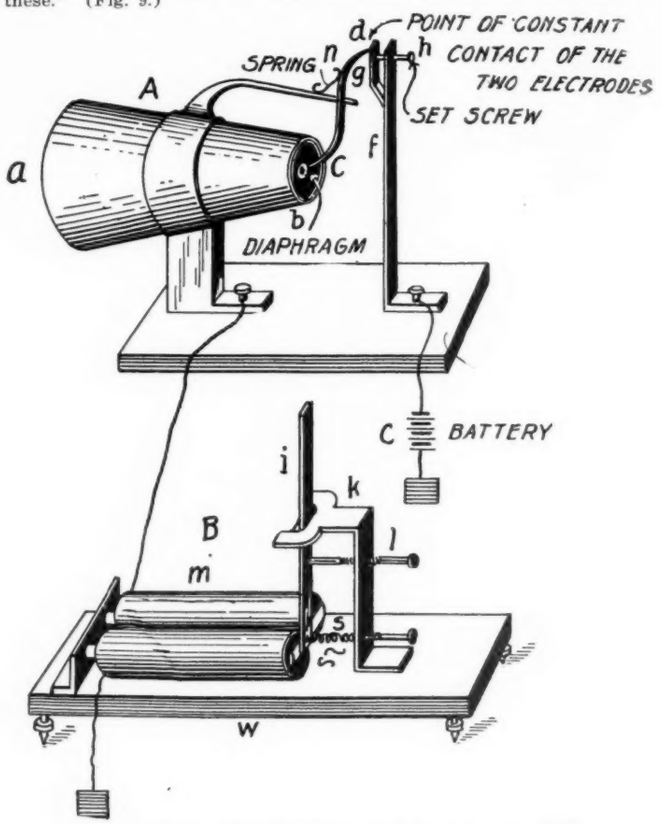


FIG. 9—THE REIS-LEGAT TELEPHONE OF 1863.

Legat says: (Reis & Bourseul Publications, 33.)

"The **proper lengths** of the respective arms **c e** and **e d** of this lever are regulated by the laws of the lever. It is advisable to make the arm **c e** longer than the arm **e d** in order that the **least** motion at **c** may operate with greatest effect at **d**. It is also desirable that the lever itself be made **as light as possible** that it **May Follow** the movements of the membrane. **Any inaccuracy in the operation of the lever c d** in this respect will produce false tones at the receiving station. When in a state of rest, the contact at **d g** is closed and a delicate spring **n** maintains the lever in this position. . . . Upon the standard **f** is arranged a spring with a contact point corresponding to the contact point **d** of the lever **c d**. The position of **g** is regulated by the screw **h**."

Describing the supposed operation he says:

"The lever **c d** follows the movement of the membrane and opens and closes the galvanic current at **d g** so that at each condensation of the air in the tube, the circuit is opened, and at each rarefaction the circuit is closed."

"In consequence of this operation, the electro-magnet of the apparatus in accordance with the condensations and rarefactions of the column of air in the tube **a b . . . is correspondingly demagnetized and magnetized, and the armature of the magnet is set into vibrations like those of the membrane in the transmitting apparatus."** . . .

He adds:

"In consequence of the imperfection of the apparatus at this time, the minor differences of the original vibrations are distinguishable with more difficulty; that is, the vowel sounds appear more or less indistinct,—inasmuch as each tone depends not merely upon the number of vibrations of the medium, but also upon its condensation and rarefaction."

"This also explains why chords and melodies were transmitted with marvellous accuracy, in the practical experiments hitherto made, while single words in reading, speaking, etc., were less distinctly recognizable, although even in these the inflections of the voice, as in interrogation, exclamation, surprise, calling, etc., were clearly reproduced."

"There is no doubt that the subject which we have been considering, before it becomes practically valuable, for use, will require considerable improvement; it will especially be necessary to perfect the mechanism of the apparatus to be employed; . . ."

The "opening and closing" that he speaks of was a magneto one—for a galvanic *circuit* can be relatively "opened and closed" regardless of the fact whether or no the terminals are physically in contact or are physically apart. (See Faraday's Law.)

In the above is contained a description of the magnetic method of speech transmission.

"The lever **c d** follows the movement of the membrane **and opens and closes the galvanic current at d g so that at each condensation of the air in the tube, the circuit is opened, and at each rarefaction the circuit is closed."**

"In consequence of this operation, the electro-magnet of the apparatus (in accordance with the condensations and rarefactions of the column of air in the tube **a b . . .**) **is correspondingly demagnetized and magnetized, and the armature of the magnet is set into vibrations like those of the membrane in the transmitting apparatus."**

Here is the fifth claim of the Bell patent—and the apparatus worked, while Bell's apparatus of the 1876 patent never worked.

Exact evidence of speech transmission by the Reis-Legat telephone of 1863, was before the Supreme Court. Four justices ignored it in a petulant manner, as they ignored the evidence on the point of Drawbaugh's anticipation of Bell's so-called invention.

Justices Bradley, Field and Harlan (126 U. S., p. 573) say:

"We think that Drawbaugh anticipated the invention of Mr. Bell, who, at most, is not claimed to have invented the speaking telephone prior to June 10th, 1875. We think the evidence on this point is so overwhelming, with regard both to the number and character of the witnesses, that it cannot be overcome."

But what can be said for the mental methods of the four justices who gave the majority opinion (4 to 3) of the court in favor of Bell, and denied priority and discovery to Reis in face of the following testimony given on the record by Cross, "expert" for Bell?

LOWREY'S ARGUMENT, pp. 199-203.

"47 x-Int. Do you understand that an apparatus which is capable of transmitting sounds **other** than vocal sounds, not articulate words, by causing electrical undulations similar in form to such sounds, would embody the invention described in said fifth claim?

"Ans. I do." The Amer. Bell Tel. Co. **v.** Spencer, p. 129, O., p. 3954.

From this answer it is evident that they are driven to claim even the things which they must **admit Reis did,** viz.: the transmission of sounds **other than vocal sounds,** not articulate speech— **e. g.,** the tones of the piano, accordion, clarionet, horn, organ pipe, etc., which were—of course—distinguishable only by their **Quality.** (Reis and Bourseul Publications, 17.)

Burdened with this necessity to stretch the 5th claim to the point of breaking, the witness elsewhere says:

"45 x-Int. At that time (1876) was the art of transmitting musical tones, including vocal musical tones, by electricity known?

"Ans. The art of transmitting the characteristic pitch of musical sounds, including the pitch of a sound produced by the voice was known. The transmission of all the characteristics of **any** sound —its intensity, its pitch and its quality—was not known.

"46 x-Int. Don't you, in your last answer as to what was not known, describe an art of which, if known, would have been the art of transmitting articulate speech?

"Ans. The **theoretical knowledge** of the manner in which the **one** could be done would, I think, **necessarily involve** the theoretical knowledge of the way in which the **other** could be done. The **practical realization** of an instrument which could transmit the three characteristics of pitch, intensity and **quality** of a musical sound would not necessarily involve the practical realization of the transmission of articulate speech." Molecular Record, 129.

"57 x-Int. Suppose a Reis transmitter of the form shown on page 10 or page 13 of said Prescott's work (being the form known as the Reis-Legat transmitter) is spoken into so softly as not to cause any actual separation of the electrodes, will not such transmitter act so as to vary the electric current so as to produce in such current an undulation corresponding in form to the sound spoken into such transmitter?

"Ans. When operated in the manner described, the transmitter figured on page 10 will do this."

"58 x-Int. In your opinion, will the efficiency of the Reis transmitter vary with the kind of material which is used in the electrodes?

"Ans. For use as a Reis transmitter, the efficiency is doubtless much influenced by the nature of the electrodes, which is well known to be the case in all circuit breakers.

"59 x-Int. Suppose a Reis transmitter of the form shown on page 10 of said Prescott's work is spoken to so softly as not to cause any actual separation of the electrodes, will not the transmitter produce in the electric currents in the line wire a series of undulations corresponding to the quality of the sounds spoken into such transmitter? I use the term quality in the sense in which you have used it in speaking of the characteristics of sound vibrations.

"Ans. **It will."**

(The Amer. Bell Tel. Co. **v.** Spencer, p. 131, O., pp. 3956-7.)

This testimony alone contains all which is required to defeat Bell's claim to the discovery of a new art in such a sense as to entitle him to a broad claim.

The favorite definition by counsel of Mr. Bell's invention is that he found out how to "mould" the electrical current into the form of the air-waves. Manifestly this "moulding" occurs in the transmitter; and the evidence that moulding has taken place is that speech is heard. If, then, the Reis transmitter, united with any receiver whatever, gives that evidence that the transmitter has "moulded" the current, this is proof that Mr. Bell is not the originator of this art of "moulding." Upon this point the testimony of Prof. Cross recently taken and read into this case by stipulation is instructive.

In former cases Prof. Cross had said:

"It is possible, with the Reis transmitter, to produce electrical undulations similar in form to the sound-waves producing them," **and**

"I do not deny the possibility that **in spite of the endeavors of Reis to prevent it,** the circuit may have remained unbroken, and some sounds have been transmitted by the production of electrical undulations." (Dolbear Record, 508 and 515.)

In the McDonough case he said:

"x-Int. 74. Is there no practical method of determining whether, in any particular apparatus, the deformation and loss of portions of the electrical undulations have reached such a point as to place the apparatus outside the scope of Bell's fifth claim, or, in other words, so that the apparatus will cease to operate upon the method referred to in that claim?

"Ans. If an actual piece of apparatus, which could be experimented with were produced, it would be possible to determine whether it did or did not operate according to the method described in the fifth claim.

"x-Int. 75. What would be the practical test?

"Ans. One would observe the construction of the apparatus, the mode in which it was intended to operate if this were stated, **and the results actually obtained as apparent to the ear.**

"x-Int. 76. Could you determine the question by the last test alone?

"Ans. I have not found any difficulty in determining it in any apparatus that I have ever seen.

"x-Int. 130. Do you know of any method of adjusting a Blake transmitter so that it will operate efficiently otherwise than by listening to a receiver joined in the same circuit?

"Ans. **Not of any method which would be a practical one and satisfactory.** I know of no other which has been used.

* * * * * *

"x-Int. 135. You know it to be a fact, do you not, that the electrodes of a Reis transmitter can be so adjusted relatively to each other by the mode in which the instrument is talked to that it will transmit speech?

"Ans. I have been able to transmit speech intelligently by speaking gently to a Reis transmitter in circuit with a battery and Bell magneto receiver.

"x-Int. 136. At such times, as you understand it, the Reis instrument is producing undulations similar in form to the air waves?

"Ans. It is.

"x-Int. 137. **And embodies the invention of Bell's fifth claim of the patent of 1876?**

"Ans. **I understand that it does when so operated.**

"x-Int. 139. Did you find that you were also able with that same Reis transmitter to so adjust the electrodes in their rotation to each other simply by your mode of talking to it that it would not transmit speech?

"Ans. When I talked to it loudly so that the circuit was broken frequently I was unable to transmit speech by it.

"x-Int. 140. Did it at such times embody the invention of Bell's fifth claim?

"Ans. I should say that it did not.

"x-Int. 141. Then, according to your belief, the determination of the question whether or not a Reis transmitter embodies the invention of the fifth claim of Bell's patent of 1876 does not depend upon the construction of the instrument or the relation of the parts to each other when at rest, but upon the mode in which the instrument is used; is that correct?

"Ans. It is."

(The N. J. McDonough Record, pages 152, 153, **et seq.**)

Cross knew that the apparatus of Bell would not operate.

Cross knew that the apparatus of Reis would operate.

Cross being a "Bell expert" had to say something out of the confusion of his mind, and *so he declares that upon the "mode in which the Reis instrument is used" depends the "determination of the question whether or not the Reis transmitter embodies the fifth claim of the Bell patent of 1876."* A greater unconscious self-degradation of mind can hardly be imagined!

The record is complete.

Until a new current is found the following elements cover and govern the transmission of speech by electricity:

Laws of Faraday.

Laws of Lenz.

Discovery of Method by Bourseul.

Application of Method by Reis.

Special patents may be had, such as those of

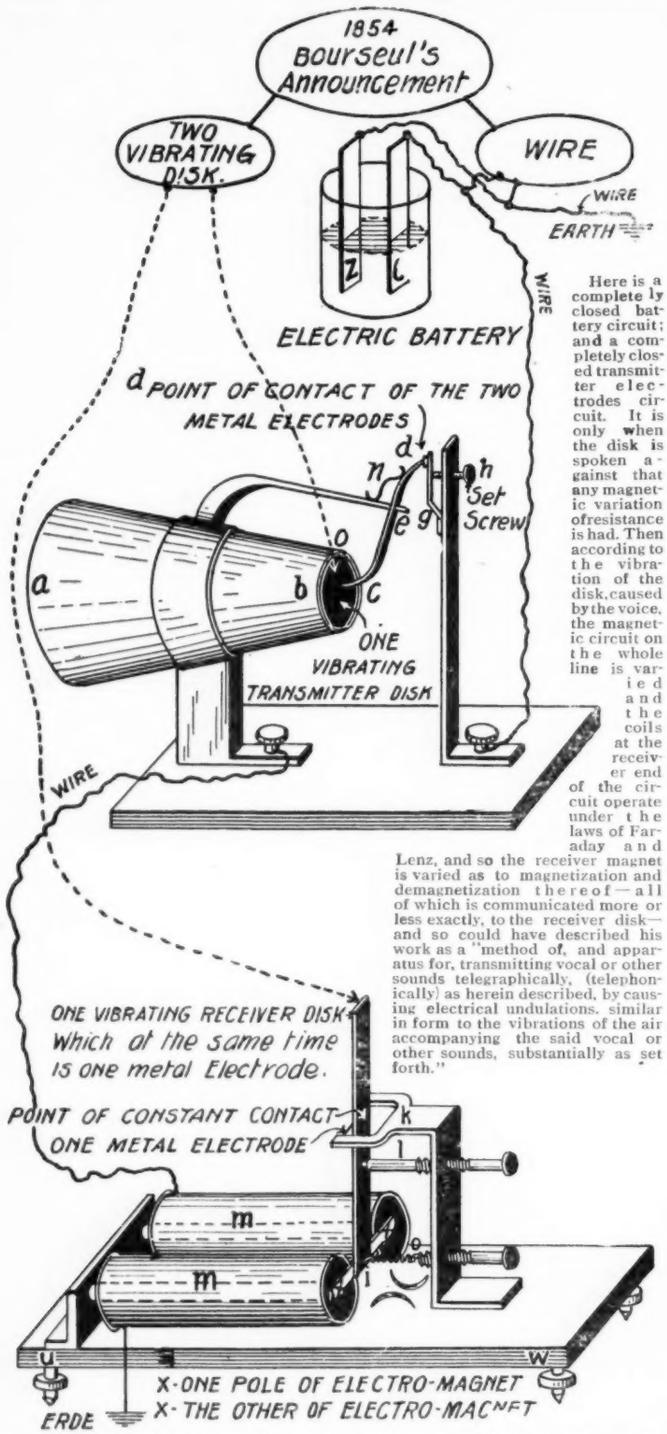
Edison, carbon transmitter....(Used from 1878)
Bell's 1877 device .....(Abandoned)
Berliner 1877 devices .....(Declared void)
Carty, multiple exchange.....(Declared void)

and many others. None of these could be the subject of broad or monopoly claims.

Broad or monopoly claims (unless a new current is had), were stopped by Bourseul and Reis.

In spite of the fact that Reis had, as stated and demonstrated, stopped any claim for monopoly of electrodes in (see Ewing's opinion of 1881),

1. Constant contact, and therefore, use of.
2. "Undulatory currents," and, above all, use of.
3. Electricity in transmitting speech—there has been maintained by the Bell Telephone Company and its numerous creatures, the most outrageous monopoly of the telephone business, from 1878 until 1893, on Bell's patent of



Here is a complete ly closed battery circuit; and a completely closed transmitter electrodes circuit. It is only when the disk is spoken against that any magnetic variation ofresistance is had. Then according to the vibration of the disk, caused by the voice, the magnetic circuit on the whole line is varied and the coils at the receiver end of the circuit operate under the laws of Faraday and Lenz, and so the receiver magnet is varied as to magnetization and demagnetization thereof—all of which is communicated more or less exactly, to the receiver disk—and so could have described his work as a "method of, and apparatus for, transmitting vocal or other sounds telegraphically, (telephonically) as herein described, by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth."

If Reis had used a thin iron *disk* instead of the *strip* of iron and had put the disk right on the poles, and then covered the whole with a close tube with the disk end open he would have had the receiver of to-day.

The Bell transmitter of 1877 (the Centennial device) did not work any better than this transmitter of Reis'.

The Blake transmitter is duplicate of Reis-Legat transmitter, only using better material and being mechanically better constructed.

This transmitter left nothing to be done except to get carbon electrodes—metal disk which is at same time in constant contact with the carbon.

This receiver left nothing to be done except to get better adjusted coils—better shaped disk—and better mechanical construction.

None of these things will warrant the Bell's fifth claim.

FIG. 10.

1876, and practically since then, up to Judge Brown's decision, on what is known as the Berliner claim.

We will now review Mr. Bell.

Alexander Granam Bell had been engaged for some time, prior to 1875, in inventing and patenting a system of Multiple Harmonic Telegraphy.

April 6th, 1875, Bell obtained a patent in Multiple Telegraphy.

Feb. 25th, 1875, Bell had filed an application for patent for further inventions in the art.

In this system he used *electro-magnets* with *steel spring armatures* (reeds) each armature having a different fundamental tone, and kept in vibration by the action of a local battery, the vibrations making and breaking the circuit, and producing an intermittent current on the line wire.

The *receivers were electro-magnets*, with like armatures, each receiving armature responding only to the fundamental tone or rate of vibration of its counterpart transmitter.

He found that by this method, using an intermittent battery current, only a limited number of signals could be transmitted. The intermittent current being produced by wide "makes and breaks," the reactions of secondaries on primaries (see Faraday's and Lenz's Laws), with the resulting "extra currents," so confused the situation that it was really useless, and so he conceived *the ridiculous idea of making his battery current continuous, thereby keeping the electro-magnet always charged, and then, by means of the vibrating armature, throwing on the wire magneto currents also.*

Here is what he had:

The battery circuit is the original primary.

The transmitter electro-magnet (with its reed armature) is the secondary of the battery circuit which excites it.

The reed armature of the transmitter electro-magnet is its secondary.

The receiving electro-magnet is the secondary of the transmitting electro-magnet.

The reed armature of the receiver magnet is its secondary. (Fig. 11.)

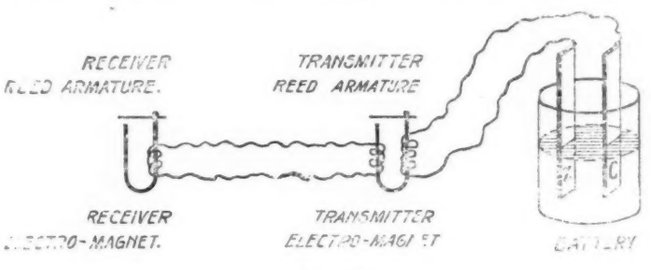


FIG. 11.

The current from the battery continuously flowed and magnetized the transmitter electro-magnet. Any change of the magnet circuit such as vibrating its secondary—its reed armature—reacted upon the battery circuit in accordance with the laws of Faraday and Lenz; (this reaction, of course, modified the magnetization of the transmitter magnet and so there was a see-sawing between the "make and break of the transmitter circuit" in the transmitter magnet. One must always remember that the reed armature was one electrode and the magnet pole the other electrode. If the "make and break" of the magnetic circuit was a wide one, such as would result from physical separation of the electrodes, then the gap was not bridged by the current and speech did not result); and also at the same time produced impulses in the secondary of the transmitter magnet circuit which, in turn, reacted upon the transmitter magnet circuit, to all of which confusion and complexity was added the reactions of the consequent "make and break" of the receiver circuit by its armature vibration.

And yet Bell got so far as to think that a "pulsatory action might be induced in the voltaic current itself by the motion of the reed."

August 14th, 1875, he wrote to Hubbard:

"On glancing back over the line of electrical experiments, I recognize that the discovery of the magneto-electrical current generated by the vibrations of the armature of an electro-magnet in front of one of the poles, is the most important point yet reached. I believe it is the key to still greater things. Don't you think it would be well to take out a **caveat** for the use of the magneto-electric current?"
(Dowd's Case, 1-482-3.)

He had "discovered" the Laws of Faraday and Lenz!

He was applying these laws to transmit a complete magneto-physical "make and break" impulse to a secondary and with only telegraphing in view, and here was the genesis of the claim of 1876, which contained nothing upon which speech could be transmitted; and yet the Bell company have

been permitted to have a monopoly of telephoning since 1878!

And still, more than ten years before the date of these letters, Reis had transmitted speech within complete view of the laws of Faraday and Lenz, and of the limitations of the battery current, as fully hereinbefore described.

Bell was stuttering and stammering and "discovering" the Law of Faraday, which had been pronounced nearly fifty years before—a law which will remain a law until the end of time.

Bell was "discovering" the Lenz Law (which is no law at all), and full of vanity, was already conniving with Hubbard to lay a foundation for the most colossal fraud that has ever been perpetrated in the field of science.

Reis, the scientist, had given to the world the greatest completed invention that mankind has known and used.

The Bell company (the most complete combination of tricksters, wrong doers and pretenders yet assembled on this globe) has (with the help of a majority of the Supreme Court) appropriated Reis's gift to the world, and made the public pay for its own property at ruinous rates of use, and the proceeds of the wrong capitalized from $100,000 up to over $100,000,000.

The Bell company's devious way from 1876 until to-day is marked by such injuries to humanity and civilization that one feels almost despairing while trying to collect the facts and properly relate them to the subject.

Within twenty-five years the mysterious force of magnetism has almost literally discovered itself to mankind, and in that insignificant space of time has so demolished doubt and denial that every man, woman and child, having ordinary intelligence, believes that, with it, everything can be done to lessen the horrible resistance to life which up to this time has made life, for the mass of mankind, hopeless and deadly.

Abraham Lincoln said in 1865:

"I see in the near future a crisis approaching that unnerves me, and causes me to tremble for the safety of my country. As a result of this corporations have been enthroned, and an era of corruption in high places will follow, and the money power of the country will endeavor to prolong its reign by working upon the prejudices of the people, until wealth is aggregated in few hands, and the Republic is destroyed. I feel, at this moment, more anxious than ever, even in the midst of war."

This Bell company has been, from the beginning thereof, a constant offender against every sentiment which binds good men together in a community.

(See the stinging words of the Court in the Berliner and Carty cases.)

And now we come to the patent of 1876.

"UNITED STATES PATENT OFFICE.

"Alexander Graham Bell, of Salem, Massachusetts.

"Improvement in Telegraphy.

"Specifications forming part of Letters Patent No. 174,465, dated March 7, 1876: application filed February 14, 1876.

"To all whom it may concern:

"Be it known that I, **Alexander Graham Bell**, of Salem, Massachusetts, have invented certain new and useful improvements in Telegraphy of which the following is a specification:

"In Letters Patent granted to me April 6, 1875, No. 161,739, I have described a method of, and apparatus for, transmitting two or more telegraphic signals simultaneously along a single wire by the employment of transmitting instruments, each of which occasions a succession of electrical impulses differing in rate from the others; and of receiving instruments, each tuned to a pitch at which it will be put in vibration to produce its fundamental tone by one only of the transmitting instruments; and of vibratory circuit-breakers operating to convert the vibratory movement of the receiving instrument into a permanent make or break (as the case may be) of a local circuit, in which is placed a Morse sounder, register, or other telegraphic apparatus. I have also therein described a form of autographtelegraph based upon the action of the above-mentioned instruments.

"In illustration of my method of multiple telegraphy I have shown in the patent aforesaid, as one form of transmitting instrument, an electro-magnet having a steel-spring armature, which is kept in vibration by the action of a local battery. **This armature in vibrating makes and breaks the main circuit, producing an intermittent current upon the line-wire.** I have found, however, that upon this plan the limit to the number of signals that can be sent simultaneously over the same wire is very speedily reached; for, when a number of transmitting instruments, having different rates of vibration, are simultaneously making and breaking the same circuit, the effect upon the main line is practically equivalent to one continuous current.

"In a pending application for Letters Patent, filed in the United States Patent Office February 25, 1875, **I have described two ways of producing the intermittent current**—the one **by actual make and break of contact**, the other **by alternately increasing and diminishing the intensity of the current without actually breaking the circuit. The current produced by the latter method I shall term, for distinction sake, a pulsatory current."**

The Bell Company's whole claim, for monopoly, before the court, rested upon an impudent attempt to show that Bell had discovered some new quality of current.

Bourseul had announced that the **"increase of pressure between** two electrodes in constant contact **produces a diminution in their electric resistance."**

In telephony—there is no difference between an "intermittent current," a "pulsatory current" and an "undulatory current," **except in the degree of magnetic "make and break"** made by the action of the transmitter in the steadily charged line.

"My present invention consists in the employment of a vibratory or undulatory current of electricity in contradistinction to a merely intermittent or pulsatory current, and of a method of, and apparatus for, producing electrical undulations upon the line-wire.

"The distinction between an undulatory and a pulsatory current will be understood by considering that electrical pulsations are caused by sudden or instantaneous changes of intensity, and that electrical undulations result from gradual changes of intensity exactly analogous to the changes in the density of air occasioned by simple pendulous vibrations. The electrical movement, like the aerial motion, can be represented by a sinusoidal curve or by the resultant of several sinusoidal curves.

"Intermittent or pulsatory and undulatory currents may be of two kinds, accordingly as the successive impulses have all the same polarity or are alternately positive and negative.

"The advantages I claim to derive from the use of an undulatory current in place of a merely intermittent one are, first, that a very much larger number of signals can be transmitted simultaneously on the same circuit; **second, that a closed circuit and single main battery may be used."**

Reis had used a closed circuit with the electrodes of the transmitter in constant contact, and therefore was using an "undulatory current" according to Bell's own definition. Yet the Supreme Court denied that Reis had electrodes in constant contact, and all for the purpose of favoring Bell's monopoly claim, which could not be actuated, even with the use of constant contact electrodes.

Yet Bell's apparatus never had a closed circuit (when a transmitter was in the line) for the very good reason that the electrodes were never in physical contact, and there was no way to get the "variable resistance" or the "undulations" which result from the "make and break" of electrodes in constant physical contact. (Fig. 12.)

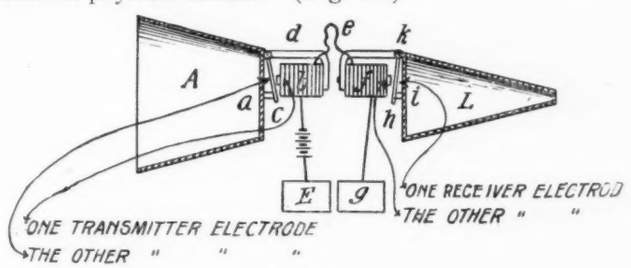


FIG. 12.

The electrodes were only in magnetic contact. Here Bell was trying to work a physical make and break transmitter, hoping to get around Bourseul and Reis, who had intelligently declared for and used constant contact electrodes. The apparatus utterly failed to transmit even a syllable of speech.

(Much of the following is from Ewing's opinion.)

Minutes of Testimony.

June 2, 1875—Bell invented device No. 7 (described in specifications and illustrated in the drawings of patent of 1876), and constructed by Watson under Bell's supervision June 2d to 5th, while Bell was fussing with his **multiple harmonic telegraph.**

June, 1875—Bell tried to transmit speech with device No. 7 as a transmitter in circuit with one of his harmonic receivers.

He testifies "he remembers nothing of these experiments except was encouraged to reconstruct instruments, and lighter armature." **Watson** says Bell heard nothing, while he heard faint sound.

July 1, 1875—Bell, in letter to Hubbard July 1st, 1875, says: "On singing this afternoon in front of a stretched membrane attached to the armature of an electro-magnet, the varying pitch of the voice was plainly perceptible at the other end of the line. When the vibrations are received on another stretched membrane in place of a steel spring, it is possible, nay, it is probable that the **timbre of the** sound will be perceived."

July, 1875—Bell and Watson made a second membrane telephone, a duplicate of the first, and the two were connected on the same line, as transmitter and receiver, the devices being same as Fig. 7, and they operated exactly as the subsequently issued Patent of 1876 prescribes.

Bell says: "Don't remember distinctly details,—but remember Watson said he heard me speaking, although he could not quite make out what I said."

Hubbard: "Could hear a sound, but could never distinguish spoken words."

The Examiner (in opinion), speaking of evidence in Interference cases and Dowd's case, says: "This is the only experiment made with these or any similar instruments of which the results are made to appear."

Dec. 28, 1875—Bell prepared at Toronto, Canada, a description for foreign patent work in matter of these inventions. In this description is a diagram of device No. 7 with note: "First attempt to transmit the human voice. The varying pitch of the voice could be dis-

criminated, but not the quality. A sort of muttering effect was perceived at the receiving end, when a person talked very loudly at the other end."

(Examiner's Report, p. 301.)

Oct. 31, 1877—Bell, before London Society of Telegraph Engineers (Prescott, pages 70-71) said of device No. 7: "The results, however, were unsatisfactory and discouraging. Watson (at first experiment) thought he heard a faint sound proceed from the telephone at his end of the circuit,—but I could not verify his assertion."

The foregoing is a fair summary of all the testimony ever offered by the Bell crowd as to device No. 7, patent of 1876, being a practical speaking telephone, within the requirements of the law, at date of issuance of patent, March 7th, 1876.

This patent did not confer an exclusive right in articulate telephony.

There is not an expert who can even to-day make an instrument conforming to specifications of this 1876 patent, and transmit speech. Bell could not do it, did not do it, and fully admits it—yet

Cross and Henck swore (Dowd's case, Vol. I.) that they did, June 5th, 1879.

F. L. Pope and E. S. Renwick and Wm. S. Goodrich swore in February, 1879, that they could not after second trial.

One cannot help curiously speculating upon the judicial mind—when the judicial decisions (with or without collusion of parties), in favor of Bell are scanned.

The patent is therefore void from the beginning, so far as speech transmission was concerned.

Bell did not claim in his specification that his invention was intended to transmit speech.

Bell's only expressed object was an improvement in multiple and harmonic telegraph.

The law requires the inventor to tell the public clearly the use and uses to which his invention is applicable, and his monopoly is confined to such use or uses. (**Detwold v. Reeves,** Am. 4, Law Journal, N. S. 189.)

But two expressions even hinting at speech transmission:

1. "And the telegraphic transmission of voices or sounds of any kind" (This in the midst of descriptions of Nos. 5 & 6).

2. In the 5th claim, where invention is described as intended for transmission of "vocal and other sounds."

All the "vocal sounds" he was thinking of were musical tones.

If it be doubtful whether the specification claims the transmission of speech then it cannot be construed to include it.

Barrett v. **Hall**, 1 Mas. 447.

Hastings v. **Brown,** 16 Eng. L. & E., 172 S. C.

Curtis on Patents, see 229.

The Supreme Court got around this obstruction as gracefully as a toad would get from under a harrow.

In his application for patent of 1876, in enumerating the advantages of his invention he says: **"A very much larger number of signals" can be transmitted at the same instant over the same wire,** and in this enumeration there is not the slightest allusion to transmitting speech.

It is very clear that **Bell had No. 7 device** with reference to transmitting **vocal or instrumental music;** while his other devices obviously transmit a few fundamental tones to serve as signals in telegraphy.

In his patent of 1877 he recites the purpose of each one of his previous patents, and says of this 1876 patent only this: **"In letters patent granted to me Mar. 7th, 1876, I have shown a method of, and apparatus for, producing musical tones by the action of the undulatory currents of electricity."**

Bell named his invention "Multiple Harmonic Telegraphy."

Bell claimed use of "undulatory electric currents" vs. "pulsatory currents."

Bell describes the pulsatory currents exactly as the current which, ten years before, Reis had successfully used in telephony, and exactly as the currents now commercially used.

Bell's great idea was by "breaking and making" the magnet circuit "to throw the battery current into waves."

(Eng. prov. application).

Bell found this a useless complication (see patent 1877) and rejected the voltaic current.

Bell had left only the magneto currents; could not use induction coils, for his receiver was in the same circuit with magnets and voltaic current. These have been superseded by voltaic current. Reis, ten years before, used them decisively as against magneto currents.

Bell had no induction coil in the circuit, with the secondary including the receiver magnet, and its armature the receiver and diaphragm, therefore he did not have a good receiver.

Bell did not claim speech transmission.

Bell could not transmit speech although he persistently attempted it.

With all these facts absolutely known to the world, how came it that the monopoly of the Bell company for speech transmission has been maintained from 1878 until 1893 upon this patent?

Until some conniving lawyer or lawyers and some unscrupulous, greedy and vicious men got hold of Bell he seems to have been frank and fairly manly.

He had failed from 1875 to June, 1876, to get transmission of speech with devices and methods of 1876 patent.

June 25, 1876—Bell, at the Centennial, actually transmitted speech: —(but not with 1876 patent devices or methods).

Oct. 3, 1877—Bell (in the lecture in London—Prescott, pp. 71 & 72), showed the two instruments side by side, and told the history of each—how 1876 patent utterly failed. How by the invention of the differently constructed instruments he transmitted speech at the Centennial, June 25th, 1876.

In the March, 1876, device, one end of an iron bar is "fastened loosely to the uncovered leg of a magnet," while the other end is "firmly attached to the center of a stretched membrane," on which the sound vibrations are conveyed.

(EWING): "The vibrations of the membrane *were expected* to vibrate the iron bar *so as to create a magneto current* in the helix strong enough to *"undulate"* the *continuous battery current,* and through these undulations to vary the strength of the electro-magnet *of the receiver,* and thus vibrate a corresponding iron bar and membrane in it."

"Early in summer of 1876" Bell and assistants made the "Centennial" Transmitter. For the iron bar they substituted a thin iron diaphragm, glued to the center of the stretched membrane, and entirely unconnected with the magnet. They also made a receiver which still more strikingly differs from device No. 7. It dispenses entirely with the stretched membrane, and has not a feature in connection with that device, except an electro-magnet.

Subsequently Bell slightly changed these devices, and patented them January, 1877.

VARIABLE RESISTANCE.

1. . . . 1863 Reis—(a)—Metal electrodes in constant contact.
   . . . 1863 Reis—(b)—(126 U. S., p. 26)—Drop of quicksilver in circuit.
2. Feb. 14, 1876, Gray—(126 U. S., p. 79)—Water in vessel in circuit.

(126 U. S., p. 77)—The invention of Gray was set forth in a caveat filed in the patent office February 14, 1878. The following is a copy of that caveat:

ELISHA GRAY,

Instruments for Transmitting and Receiving Vocal Sounds Telegraphically.

Caveat Filed February 14th, 1876. (Fig. 13.)

"To all whom it may concern:

"Be it known that I, Elisha Gray, of Chicago, in the County of Cook and State of Illinois, have invented a new art of transmitting

ELISHA GRAY

INSTRUMENTS FOR TRANSMITTING AND RECEIVING VOCAL SOUNDS TELEGRAPHICALLY.

CAVEAT FILED FEBRUARY 14TH 1876.

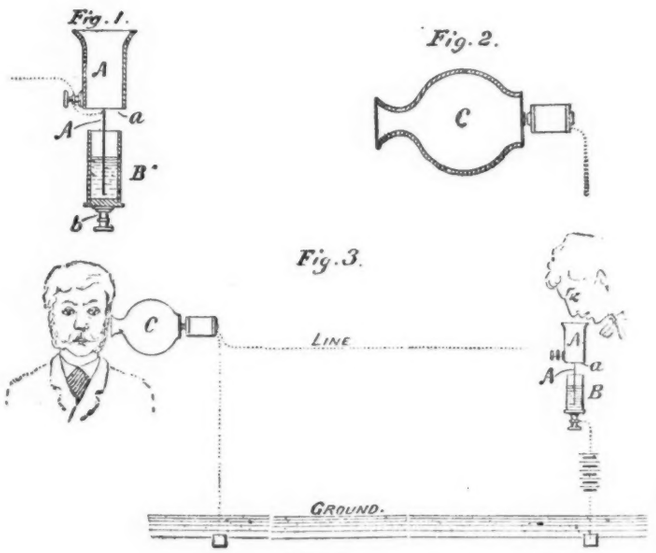


FIG. 13.

vocal sounds telegraphically, of which the following is a specification.

"It is the object of my invention to transmit the tones of the human voice through a telegraphic circuit, and reproduce them at the receiving end of the line, so that actual conversations can be carried on by persons at long distances apart.

"I have invented and patented methods of **transmitting musical impressions or sounds telegraphically,** and my present invention is based upon the modification of the principle of said invention, which is set forth and described in letters patent of the United States, granted to me **July 27, 1875,** respectively numbered 166,095 and 166,096, and also in an application for letters patent of the United States, filed by me **February 23, 1875.**

"To attain the objects of my invention, I devised an instrument capable of vibrating responsively to all the tones of the human voice, and by which they are rendered audible.

"In the accompanying drawings I have shown an apparatus embodying my improvements in the best way now known to me, but I contemplate various other applications, and also changes in the details of construction of the apparatus, some of which would obviously suggest themselves to a skilful electrician, or a person versed in the science of acoustics, on seeing this application.

"Figure 1 represents a vertical central section through the transmitting instrument.

"Fig. 2. A similar section through the receiver; and

"Fig. 3. A diagram representing the whole apparatus.

"My present belief is, that the most effective method of providing an apparatus capable of responding to the various tones of the human voice, is a tympanum, drum or diaphragm, stretched across one end of the chamber, carrying an apparatus for producing fluctuations in the potential of the electric current, and consequently varying in its power.

"In the drawings, the person transmitting sounds is shown as talking into a box, or chamber, A, across the outer end of which is stretched a diaphragm **a,** of some thin substance, such as parchment or gold beater's skin, capable of responding to all the vibrations of the human voice, whether simple or complex. Attached to this diaphragm is a light metal rod A', or other suitable conductor of electricity, which extends into a vessel B made of glass or other

insulating material, having the lower end closed by a plug, which may be of metal, or through which passes a conductor b, forming part of the circuit. **This vessel is filled with some liquid possessing high resistance, such, for instance, as water, so that the vibrations of the plunger or rod A', which does not quite touch the conductor b, will cause variations in resistance and consequently, in the potential of the current passing through the rod A'.**

"Owing to this construction, the resistance varies constantly, in response to the vibrations of the diaphragm, which, although irregular, not only in their amplitude, but in rapidity, are nevertheless transmitted, and can, consequently, be transmitted through a single rod, which could not be done with a positive make and break of the circuit employed, or where contact points are used."

The whole object—after Bourseul and Reis—(provided no new quality of magnetic current was discovered and applied), was to get better closed and constant contacts of the transmitter electrodes, so that the greatest advantage could be had of Bourseul's announcement of the fact that *"the increase of pressure between the two electrodes in constant contact produces a diminution in their electric resistance."*

Gray sought this desirable thing by immersing one electrode in a liquid which was in constant contact with the other electrode. He clearly denies Bell's apparatus of Feb. 14, 1876, when he says the *"vibrations of the diaphragm . . . can be transmitted through a single rod—which could not be done with a positive make and break of the circuit employed."*

Bell's 1876 device was an absolutely open circuit so far as physical contact of the electrodes was concerned, and the vibration of the diaphragm (which was attached firmly to the armature magnet rod) "made and broke" the open field magnet circuit in such a wide manner that speech could not be had.

Gray did not think (metal) "contact points" could operate as well as his liquid method. However, as a matter of fact, and as soon as carbon was used, constant contact carbon points or electrodes displaced all other contacts.

Reis's method was absolutely adopted—but the material of electrodes changed.

"I contemplate, however, the use of a series of diaphragms in a common vocalizing chamber, each diaphragm carrying an independent rod, and responding to a vibration of different rapidity and intensity, in which case, contact points mounted on other diaphragms might be employed.

"The vibrations thus imparted are transmitted through an electric circuit to the receiving station, in which circuit is included an electro-magnet of ordinary construction, acting upon a diaphragm to which is attached a piece of soft iron, and which diaphragm is stretched across a receiving vocalizing chamber c, somewhat similar to the corresponding chamber A.

"The diaphragm at the receiving end of the line is thus thrown into vibration and corresponding with those at the transmitting end, and audible sounds or words are produced."

"The obvious practical applications of my improvement will be to enable persons at a distance to converse with each other through a telegraphic circuit, just as they now do in each other's presence, or through a speaking-tube.

"I claim as my invention, the art of transmitting vocal sounds or conversations telegraphically through an electric circuit.

"ELISHA GRAY."

Aug. 14, 1875, Bell, in a letter to Hubbard, says:

126 U. S., p. 217—"On glancing back over the line of electrical experiments, **I recognize that the discovery of a magneto-electric current generated by the vibration of the armature of an electro-magnet in front of one of the poles, is the most important point yet reached.** I believe that it is the key to still greater things. The effects produced, though slight in themselves, appear to me so great in proportion to their cause, that **I feel sure that the future will discover means of utilizing currents obtained in this way on actual telegraph lines.** So important does it seem to me to protect the idea that I think some steps should be taken immediately towards obtaining a caveat or patent." For what? **"For the use of a magneto-electric current, whether obtained in the way stated above (by the vibration of permanent magnet, in front of electro-magnets), or in any other way. I should wish to protect it especially as a means of transmitting simultaneously musical notes differing in intensity as well as in pitch. I can see clearly that the magneto-electric current will not only permit of the actual copying of spoken utterance,** but of the simultaneous transmission of any number of musical notes (hence messages) without confusion."

Then, further down, he says: **"When we can create a pulsatory action of the current,"**—he had not then created it,—**"which is the exact equivalent of the aerial impulses, we shall certainly obtain exactly similar results."**

Then he ends the letter with this: "Don't you think it would be well to take out a caveat for the use of the magneto-electric current? **In its present undeveloped state, it might be unwise to let Gray know anything about it, unless, indeed, we could secure the principle of it in a patent."**

Thus he announced his purpose in advance to patent the principle without waiting to invent the mechanical means for its application.

Bell was all the while dominated by the idea that he had discovered something when, as a matter of fact, he was unconsciously applying the laws of Faraday and Lenz for a use which they will forever deny. The dates, with reference to his allusion to Gray, are significant.

Feb. 14, 1876—Gray had a metal rod for armature electrode.
Feb. 14, 1876—Bell had a metal rod for armature electrode.
Feb. 14, 1876—Gray had his armature electrode in constant contact with the field electrode through the medium of the liquid, and it worked.
Feb. 14, 1876—Bell did not have his armature electrode in physical contact with the field electrode at any time.
Feb. 14, 1876—Gray had a soft iron armature (attached to his receiver diaphragm) vibrating *in contact* with the field magnet of the receiver.
Feb. 14, 1876—Bell had an iron armature (attached to his receiver diaphragm) vibrating *not in contact* with the field magnet of the receiver, as may be seen in his sketch here shown.

In December, 1875, he went to Canada to induce Mr. George Brown of Toronto to take out in Europe patents for the invention which he was to patent here. Upon the 28th of December he gave Brown a memorandum on which he had made a sketch of which the following is a fac-simile.

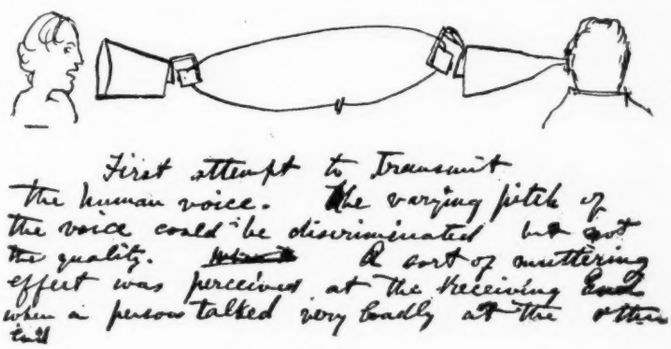

First attempt to transmit
the human voice. The varying pitch of
the voice could be discriminated but not
the quality. A sort of muttering
effect was perceived at the receiving end
when a person talked very loudly at the other
end

FIG. 14.

Yet a majority of the acting judges of the Supreme Court, having all this evidence before them, gave to the Bell gang a monopoly for the use of electricity upon devices for speech transmission that the inventor admits never worked—and upon a claim which did not claim speech transmission (but which does express the actual works and devices of Reis, made and used for speech transmission over twelve years before), and upon devices which neither the inventor nor anyone else has even been able to get a word through!

But to return to the subject of variable resistance method.

3. 1876-77—Bell's liquid transmitter, referred to hereinbefore. (126 U. S., page 323.)

Upon none of these could a monopoly claim be based. In fact, they were soon discarded—and the commercial transmitter, then and now, is the constant contact transmitter of Reis,—only iron or soft steel diaphragms are used,—and with carbon electrodes displacing the metal ones.

In contests over the 1876 patent and over the famous or infamous "Berliner" claim, much has been said of the so-called "liquid transmitter."

At the Centennial, Bell used this device, which was a *constant contact transmitter,* or microphone—that is his "liquid transmitter."

(Bell got his idea from Reis' mercury liquid transmitter.)

(126 U. S. Cases.) In previous "telephone cases" (to the Berliner fight of 1896) the Bell witnesses testified that this liquid transmitter of Bell's was very different from the Gray liquid transmitter, and was in fact a true microphone, with a surface contact, the variations in resistance being "at the contact of the rod and the liquid."

But as a matter of fact this patent is ambiguous, as is all of Bell's work, and there is no verity or truth in the varying

positions his lawyers and witnesses have taken throughout all telephone contests. For instance (and a shameless one):

In the 1896 Berliner cases—*the Bell company,* in paragraph 7 of its answer, avers that the *adjustment of pressure between the electrodes is mechanical.*

Bell's counsel, in their briefs, argue that the *principles are electrical.*

The same counsel, in trial of Bell telephone cases, 126 U. S., 278, stated that the principles employed were *mechanical, not electrical.* Bell's expert (Cross) in 1896 cases said the principles employed in the adjustment of pressure were mechanical. Such are the methods of bandits in the field of monopoly.

July, 1901, Berliner case: Claim being made that this liquid transmitter anticipated the Berliner constant contact claim, counsel for Bell company undertook to brush this liquid transmitter aside, as simply a laboratory experiment. As to this, Judge Brown, in deciding the case, gives these precious attorneys a straight jolt.

Judge Brown's opinion: *"The attempt* to dispose of that apparatus by characterizing it as a mere laboratory experiment, after * * * it was presented to the Supreme Court (126 U. S., 247-322) as a speaking telephone, *is not successful. This instrument is quite as important after the expiration of the Bell patent as before."*

It must be borne in mind that the Bell monopoly was solely claimed upon the devices and methods of 1876 patent, from 1878 to 1893. Why not upon 1877 patent—the devices of which really worked? Because it was a specific device or apparatus patent. In 1879, the business seemed to be springing from the earth, and showering from the clouds; and the Western Union had settled with the Bell company; then the Bell gang looked around, peering everywhere for something upon which a monopoly claim for use of electricity in speech transmission could be had. Only Bell's 1876 patent was sufficiently obscure in its terms and definite in its promises to answer the needs. Edison and Berliner claims were bought, other obstructions removed and the campaign planned to capture the Supreme Court. (See A. G. Holcomb's article in "Telephone" of July, 1898.)

Ewing: "The claim of Bell to every transmission of sound 'by causing electrical undulations similar in form to the vibrations of the air,' needed a broad base to support it. This was supplied by the astounding concession made to him (by the court) in the Spencer case, that he is 'admitted * * * to be the original first inventor of any mode of transmitting speech;' and by 'but Bell discovered a new art—that of transmitting speech by electricity—and has a right to hold the broadest claim for it which can be permitted in any case' * * * and that 'the invention is nothing less than the transfer to a wire of electrical vibrations, like those which a sound has produced in the air.'"

The Bell company bought, about 1879, the Edison carbon transmitter (not issued until about 1893), the Berliner "make and break" transmitter, issued in 1891, after changing to constant contact transmitter, etc. (See Judge Brown's 1901 decision.)

So the Bell gang had for sand-bags, with which to club any opponents, the four patents or patent applications, viz.:

(1) Bell's (Jan. 30, 1877) contact transmitter (too vague for special claim even, as subsequent events proved.

(2) Edison's "carbon" transmitter.

Edison filed his application for a "speaking telegraph" April 27, 1877.

"In a speaking telegraph transmitter, the combination of a metallic diaphragm and disc of plumbago, or equivalent material, the contiguous faces of said disc and diaphragm being in contact."

Edison's transmitter was in practical use in 1878. Edison knew of Charles Bourseul's announcement that "the increase of pressure between the two electrodes in constant contact produces a diminution in their electrical resistance" and refers to the fact in his specifications.

The Bell people did not wish to rely on Edison's claim for "constant contact" transmitter, but saved it for a carbon transmitter.

(3) Berliner's make and break transmitter claim. (Berliner's application filed June 4, 1877, patent allowed Nov. 17, 1891.) This claim was shamelessly juggled and changed to an express "constant contact" claim.

(4) Carty multiple exchange patents.

Berliner foreign patents: Berliner, in his application as filed June 4, 1877, referring to such instruments as might operate by "constant contact," says: "These simple instruments will reproduce any musical sound uttered in the neighborhood of one of them, but for the reproduction of special sounds, such as speech, they are not adapted."

Judge Brown's opinion of 1901: " * * * in my opinion * * * and as a matter of fact, Berliner, on June 4, 1877, the date of his application, had not made the discovery that speech could be transmitted with the apparatus of the patent in suit, and was at that time, and long after, like other unsuccessful experimenters, attempting to use a broken current."

Judge Brown makes the old mistake. No judge yet seems to see that *Reis had a closed telephonic circuit.* Bell had an open telephonic circuit in his 1876 devices; that is, where the *unbroken line current* was *"made and broken"* by the action of the transmitter diaphragm vibrations, *to the point of only magnetically closing and separating the never in physical contact electrodes. In telephony there can be no closed circuit except where the terminals are in constant physical contact.*

Berliner then describes a double pin transmitter, which is necessarily a "make and break" transmitter, and claims the transmission of speech by it.

It is absolutely clear that the "constant contact" method was expressly disclaimed by Berliner in the June 4, 1877, application.

Am. App'n of 1877. Berliner amended the application in 1877 (and sold the claim to the Bell company in 1878). This amendment did not contain the constant contact claim.

Bell Co.'s Amendments: The Bell company made two amendments; the entire specifications and drawings having been twice erased and new ones substitutetd.

Berliner's oath to Amendments May 27, 1881. Berliner did not file the oath of the amendments until May 27, 1881,—nearly four years after the invention had gone into commercial use.

Examiner's action: All of the examiners in the Patent Office, six in number, who actually passed upon the merits of the question from 1880 to the issue of the patent of Nov. 17, 1891, found and determined that the application, as filed June 4, 1877, did not contain a description of the constant contact transmitter of the patent.

1901 Case, Bell Co. vs. The National Telephone Mfg. Co. In which, on complete issue, Judge Brown of U. S. Circuit Court, District of Massachusetts, found that:

*"This patent was void for error appearing upon the face of the records of the Patent Office; * * * In addition to the fundamental defects in the complainant's title to the patent, it appears that the best argument that skilled experts and learned and ingenious counsel can base upon this patent is logically untenable and legally unsound."*

The farmers of the West and the citizens of the small towns made the fight. It was their great fortune to have, as counsel, Judge Taylor. He quietly but thoroughly met the Bell lawyers with their tricks and lies, and made it possible that an intelligent and honest judge might so announce, from the bench, the character of the Bell creatures.

THE EDISON PATENTS.

Apr. 27, 1877, issued May 3, 1893 (474,230).

July 20, 1877, issued May 3, 1893: In a telegraphic apparatus operated by sound, **the combination,** with the diaphragm, of one or more contacts of plumbago or similar inferior conductor in the electric circuit, whereby the rise and fall of electric tension is proportional to the pressure exerted upon the said point or points by the diaphragm, substantially as set forth (474,231).

July 20, 1877, issued May 3, 1893: A spring forming or carrying one electrode of a circuit of a telephone, and constantly pressing against the other electrode and diaphragm to maintain the required initial pressure between the electrodes and yield to the movement of the diaphragm, substantially as described. (474,232.)

Sept. 5, 1877, issued Mar. 7, 1893. (492,789.)

The American Bell Telephone Company got these patents from the Western Union Telegraph Company, by the contract of Nov. 1, 1879—when these two examples of "corporations enthroned" (the sort Lincoln feared) shut off competition in telephony and attempted to do the same in telegraphy.

These patents could not be the base of monopoly patent claims, but they were essential in commercial telephony. The proof of it is found in the fact that after the Bell gang got these patent claims in 1879, the carbon devices were used to the exclusion of the Bell 1876 (monopoly patent for use of electricity) patent, and the 1877 special device patent;

and yet these patents were not issued until 1893—just after the monopoly under the 1876 patent had ended.

While the contest was going to end the claims of the Bell monopoly thereon, and on the Berliner claims, a thing occurred which (through the honesty of the Commissioner of Patents) exposed one of the dirty, impudent methods of the Bell gang. It seems that the Bell creatures had been making requests for copies of papers, claims, allowances, etc., from the secret files of the Patent Office, so that they might possibly repeat the Gray experiment. It will be interesting and instructive to know how much, if any, information they got from pliant and tricky custodians of the secrets of the people of this land. A congressional inquiry should be made in this matter, and then a reckoning may be had with these Bell creatures. At any rate, J. J. Storrow sent an impudent request to the commissioner, and got the following reply. (See Chas. H. Aldrich's Memorial to the 53d Congress.)

DEPARTMENT OF THE INTERIOR, UNITED STATES PATENT OFFICE.
Washington, June 1, 1893.

J. J. Storrow, Esq., Boston, Mass.:

SIR:—I have your esteemed favor of May 31st and June 1st, *requesting this office* not *to divulge to any one and especially to the Department of Justice, or its counsel, or its representatives, a list of your requests for copies of papers on file here. While I note this request I ought also to say that the Department of Justice is regarded not only as the official legal adviser of the government but of this office as well, and it is understood that the Attorney General and his representatives have access to the secret files of this office, and that I could not properly refuse to comply with any official request of that Department for copies of such files, or of any files.*

It would seem that the Department of Justice and this office are one and the same arm of the government, and that the secrecy contemplated by law and provided for by the rules of the Patent Office does not exclude and was not intended to exclude the Department of Justice from any file or paper or transaction in this office.

Should occasion arise, therefore, I do not see my way clear to comply with your request.

Very respectfully yours,
JOHN S. SEYMOUR,
Commissioner.

(Berliner Record, Vol. 2, page 1344.)

It is very hard to see how the Bell creatures could have survived such an exposure. However, they popped up, impudent, and, as it turned out, impotent, in the Berliner and Carty cases. (See Judge Brown's and Buffington's decisions.) It is fine that our judges are learning much about electricity, and that they are sharing the common belief that monopoly based upon fraud shall end. The farmers and Judge Taylor started the work in the right way.

CARTY CASES.

When it began to look a little shaky for the Berliner matter, the Bell creatures fortified their position by having John J. Carty (a Bell engineer) make a monopoly claim for the multiple exchange. Patents were allowed. The Independents paid no attention to them, knowing them to be void.

These patents appeared in the name of the Western Electric Company. It sued and enjoined an Independent company, for infringement. Prior to judgment, the Bell slily settled with the defendant, had the Western Electric keep the record as if a real contest was on, and, upon the record, had the apparent defendant make some concessions whereby ground was had for a judgment in the Bell's favor. It got it. But the judges found out that the Bell owned the Western Electric and that the court had been tricked. Proper proceedings were had, and the Bell gang were tagged by the court in a manner which would have caused an ordinary offender to turn in his tracks and try and be an honest man.

This same Western Electric (Bell) crowd have now turned up with the Independent Kellogg Company (switchboard manufacturers) in their maw. The history of that deal will probably be the subject of a court decision. It will not be hard to defeat the Bell in this attempt to throttle honest competition. Every honest man should take an interest in exposing the Bell gang at every step.

We will now take a look at the opinion of the court:

126 U. S. p. 581. (The comments are in brackets.)

"**Mr. Chief Justice Waite** delivered the opinion of the court.

"The important question which meets us at the outset in each of these cases is as to the scope of the fifth claim of the patent of March 7, 1876, which is as follows:

" 'The method of, and apparatus for, transmitting vocal or other sounds telegraphically, as herein described, by vibrations of the air accompanying the said vocal or other sounds, substantially as set forth.' "

(This claim might have been used by Reis to describe his actual demonstrations. The fact that Reis was a scientist and gave his discovery and his knowledge to the world should not have been used by an intelligent court for the purpose of belittling that discovery and knowledge so that a pretender and his gang might slip in and monopolize the property of the world against the world.

It was a shocking thing that the four judges of the Supreme Court should have been imposed upon by so shallow a thing as this claim.

Any *make and break* of any *charged circuit* will cause undulations in that charged circuit similar in form to the vibrations, *not only of the air, but of the air and the wire*, accompanying the make and break.

So long as man shall use the present battery current, just so long will the laws of Faraday and Lenz exactly govern the action in any electrically charged circuit when it is made and broken. *Bourseul settled the method question. Bell had no apparatus to operate that method. Reis had settled the matter apparatus.* Yet the four judges let a play upon words mislead them.

Lowrey warned them (p. 165): "A claim is thus virtually made to speech transmission *by the transmitting* of it; or, in other words, for all *such doing* of a thing as is *provable* by its *being done.*"

(p. 206) . . . "*Mr. Lowrey* urged that it is a moot question whether absolute continuity of current is requisite to speech transmission; saying that it is not proved that speech cannot be transmitted when the current is intermittent; and therefore that the fact of transmission by a current *capable* of being broken does not prove that it has at all times remained continuous.

"It is undoubtedly proved that something occurs in the electrical field which has an agency in the reproduction of sounds. Whether it is some variation of the intermolecular relations of the conducting medium brought about by attaching the conductor to a source of electricity; or some change in the tension of whatever is the product of the battery or magnet, and therefore called electrical; or whether it is some occult process as yet not recognized, which results in allowing motion to be transferred and reproduced is not known.

"Mr. Bell has taken a step forward and given the name of 'electrical undulations similar in form' to that something which occurs. Having thus embodied and personified the theory in an expression, he has taken a patent for the expression and is now in position to restrain all transmission of speech upon the ground that when it is transmitted 'undulations similar in form,' etc., are caused, and his idea thereby infringed.

"That Mr. Bell and his experts are wrong, and that the proximate cause of speech may hereafter be found to be *not* the *similarity in form* of the undulations, etc., is not only not impossible, but in view of the many instances in which scientific theories as reasonable and as strongly upheld as the present undulatory theory of electricity have proved untrue, is not highly improbable."

Mr. Lowrey's argument was complete and conclusive and it is not seen how there could have been an excuse for these four judges doing the thing they did.

"It is contended that this embraces the art of transferring to or impressing upon a current of electricity the vibrations of air produced by the human voice in articulate speech, in a way that the speech will be carried to and received by a listener at a distance on the line of the current."

It is very queer that the court did not see that, *firstly*, the real contention was not whether anything that Bell had done "embraced the art of transferring to or impressing upon a current of electricity the vibrations of air produced by the human voice in articulate speech, etc.," but whether there *was* an art by which the "vibrations of air produced by the human voice in articulate speech" were "transferred to or impressed upon a current of electricity;" and, *secondly*, if there was such an art, whether any one prior to Bell's claim, had "embraced the art in a way that the speech will be carried to and received by a listener at a distance on the line of

the current;" and, *thirdly,* did Bell's device embrace the art in such a manner?

Firstly.—The art of charging or magnetizing a line, by the use of the only current then or now known to the profession, was fully settled by the laws of Faraday and Lenz. (1854) Bourseul clearly states the situation:

"The electric telegraph is based upon the following principle: An electric current, passing through a metallic wire, circulates through a coil around a piece of soft iron which it converts into a magnet. The moment the current stops, the piece of iron ceases to be a magnet. This magnet, which takes the name of electro-magnet, can thus, in turn, attract and then release a moving plate which by its to-and-fro movement produces telegraph signals."

Then he describes the printing telegraph and transmission of handwriting and drawings—and then:

"I have asked myself, for example, *if the spoken word itself could not be transmitted by electricity, in a word, if what is spoken in Vienna may not be heard in Paris?* The thing is practicable in this way: We know that sounds are made by vibrations, and are made sensible to the ear by the same vibrations, *which are reproduced in the intervening medium."* (By condenser effect between earth and air:—O. W. R.) "But the intensity of the vibrations diminishes very rapidly with the distance . . . Suppose that a man *speaks near a movable disk,* sufficiently flexible to lose none of the vibrations of the voice; *that this disk alternately makes and breaks the connection with a battery;* you may have at a distance another disk which will simultaneously execute the same vibrations . . .

"This mode of transmission requires no apparatus except on electric battery, two vibrating disks, and a wire."

Here Bourseul states the *method* of telephony and describes the *apparatus.* (See Fig. 10.)

Reis absolutely fixed the art of telephony—by following Bourseul's *method*—by manufacturing an *apparatus* following Bourseul's statement, and by *operating the apparatus exactly within the method,* and then scientifically stating the whole process and *naming the art.* (See Fig. 10.)

But the particular thing now to be pressed upon the mind of the Supreme Court is that Reis and Legat exactly describe what does happen when a transmitter disk is vibrated by the speaking voice and while such disk is in constant contact with the terminals of an electrically charged circuit.

"The lever *c d follows the movements of the membrane* and *opens and closes* the *galvanic current* at *d g* so that at each *condensation* of the air in the tube, *the circuit is opened,* and at each *rarefaction the circuit is closed."*

That a physical opening and closing of the circuit was not meant is shown by the immediately following statement:

"In consequence of this operation, the electro-magnet of the apparatus in accordance with the condensations and rarefactions of the column of air in the tube *a b . . . is correspondingly demagnetized and magnetized, and the armature of the magnet is set in vibration like those of the membrane in the transmitting apparatus."*

So the *art of doing a thing by doing it* was settled by Reis as early as 1863.

The four judges of the Supreme Court allowed themselves to give to the Bell gang a monopoly for the speech of the world upon a general claim for a "method of, and apparatus for *doing a thing by doing it,*" and then when it was found that the Bell gang had nothing to *"do the doing"* with, those amiable gentlemen allowed that sacred gang to appropriate the apparatus of Reis, Edison, Blake, et al., for the purpose of *doing the do.*

Secondly.—Reis had embraced the exact art, based exactly upon the method of Bourseul, by the use of an apparatus exactly suggested by Bourseul; had demonstrated long distance speech transmission, and had given same to the world.

Thirdly.—Bell's device or apparatus did not embrace the art in any manner. His 1877 device was a bald infringement upon Reis, Gray, *et al.*

"Articulate speech is not mentioned by name in the patent." (Gray's application demands a patent for speech transmission.) "The invention, as described, 'consists in the employment of a vibratory or undulatory current of electricity, in contradistinction to a merely intermittent or pulsatory current, and of a method of, and apparatus for, producing electrical undulations upon the line wire.' A 'pulsatory current' is described as one 'caused by sudden or instantaneous changes of intensity,' and an 'electrical undulation' as the result of 'gradual changes in intensity exactly analogous to the changes in the density of air occasioned by simple pendulous vibration.'"

(In view of the laws of Faraday and Lenz, yet such a discussion upon terms is had by the four judges who gave to the Bell gang a monopoly of the speech of the world!)

(p. 532)—"In this art—or, what is the same thing under the patent law, this process, this way of transmitting speech—**electricity, one of the forces of nature, is employed;** but electricity, left to itself, will not do what is wanted. The art consists in so controlling the force as to make it accomplish the purpose. It had long been believed that if the vibrations of air caused by the voice in speaking could be reproduced at a distance by means of electricity, the speech itself would be reproduced and understood. How to do it was the question.

"Bell discovered that it could be done by gradually changing the intensity of a continuous electric current, so as to make it correspond exactly to the changes in the density of the air caused by the sound of the voice. This was his art. He then devised a way in which these changes of intensity could be made and speech actually transmitted. Thus his art was put in a condition for practical use."

In the first place, Bell has no such art, for no one can gradually change the intensity of a continuous (present) electric current, so as *to make it correspond exactly to the changes in the density of the air* caused by the sound of the voice. One part of the proposition is left out, viz., *changes in the density of the wire as well as that of the air. It takes both of these things to produce a magnetic circuit.*

In the second place, Bell did not "devise a way in which these changes of intensity could be made and speech actually transmitted." Bell's 1877 patent cannot be considered, for it was for special device.

(p. 537)—"The method, 'as herein described,' is to cause gradual changes in the intensity of the electric current used as the medium of transmission, which shall be exactly analogous to the changes in the density of the air, occasioned by the peculiarities in the shapes of the undulations produced in speech, in the manner 'substantially as set forth;' that is to say, 'by the vibration or motion of bodies capable of inductive action, or by the vibration of the conducting wire itself in the neighborhood of such bodies,' which is the magneto method; or 'by alternately increasing and diminishing the power of the battery,' which is the variable resistance method. **This is the process which has been patented, and it may be operated in either of the ways set forth. The current must be kept closed to be used successfully, but this does not necessarily imply that it must be so produced or so operated upon, as to be incapable of being opened. If opened it will fail to act for the time being, and the process will be interrupted; but there is nothing in the patent which requires it to be operated by instruments which are incapable of making the break."**

Suppose Reis had filed, in 1863, a claim in the patent office, and exactly in the words of Bell's fifth claim of the 1876 patent, and that Bell's lawyers objected in the interest of Bell's 1877 patent, saying that Reis' transmitter did not work when the electrodes were apart. In such a case what would these judges have said? The above declaration of the court should have required a judgment against Bell, for Bell's instruments did not operate the process.

They take a few sentences from Faraday, jumble them together without understanding their real import, and then give the Bell gang a *holy process* upon the method and art of Faraday, of Bourseul, and of Reis, without the gang having any *apparatus* to work the process! Bell can have a monopoly upon the speech of the world upon a claim of "doing a thing by doing it," without having anything to do it with, or ever doing it; but Reis must not be credited with doing a thing, if he really did it!

It must be always kept in mind that Reis was a scientist and did not write or describe with reference to patent getting. He had no tricky lawyers and greedy men with slush ice hearts to promote him.

(p. 542)—"It is not contended that Reis had ever succeeded in actually transmitting speech, but only that his instrument was capable of it if he had known how. He did not know how, and all his experiments in that direction were failures. With the help of Bell's later discoveries in 1875 we now know why he failed."

Reis did transmit speech and there was evidence thereof before the court. The judges who could deny the evidence bearing upon the Drawbaugh inventions in the manner described in the minority opinion, when the issue was one merely of fact, could not be expected to view the more obscure issue with anything but a wobbling gaze.

Three judges tried to prevent the wrong being put upon the world, but they could not stop it. Four judges of the Supreme Court found it their duty to give control of the speech of the world to a gang that has

(a) Raised the capitalization of its company from $700,000 in 1878 to over $9,000,000 in 1887; and to over $20,000,

000 in 1898; and to over $100,000,000 in 1903. (See Testimony of Hudson in Berliner case.)

(b) That in 1893 tried to influence the Commissioner of Patents to betray the secrets of the people of the land. (See letter of Commissioner Seymour to Storrow.)

(c) That deserved the stinging words of Judge Brown set forth in the opinion of the court in the 1901 Berliner case. (See opinion.)

(d) That tried to cheat the court in the Carty cases.

What maligning imps darkened the doorway of the mind of the court and blinded its one inhabitant? It is just such judgments that makes us doubt whether our judges are our intelligent servants. No one having any self-esteem, would believe, much less declare, that these judges could be corruptly influenced. The only way to account for the judgment is that the judges got mixed up, and so turned to the society expressions of such men as Prof. Henry and Sir Wm. Thompson for help (see page 539), and shut their eyes and jumped.

Every minute, from the day this "enthroned corporation" started until now, the Bell gang has worked to hold an unlawful monopoly upon telephony.

For seventeen years the monopoly was held upon Bell's 1876 patent.

But the race of this common foe of all firesides is nearly run.

The courts have decided against the gang in the Berliner and Carty cases. We can safely rely upon the Supreme Court judges to unanimously affirm these judgments.

The Pupin patents, upon which the Bell gang claim a monopoly for long distance telephony, are void. for reasons soon to be shown. *The Bell managers know this.*

Chicago, October 23, 1903.

INDIANA WANTS CONVENTION.

The Interstate Independent Telephone Association will hold its annual convention December 9-10-11, 1903. The place of holding this convention has not yet been determined upon. In view of this condition we are permitted to present a letter directed to Mr. O. Rex, one of the committee chosen to solicit funds for the entertainment of the convention. The letter follows, and is self explanatory:

LAFAYETTE, IND., Oct. 12, 1903.

Dear Sir:—As there seems to be some uncertainty as to where the next convention of the Inter-State Association, which meets on December 9th, 10th and 11th, will be held, I wish to make the Inter-State Association a proposition, and would like to have you get it before the committee. As the place of meeting has not been announced through the press, would ask that you call the Inter-State Convention to meet at Lafayette upon the 9th, 10th and 11th of December, and we will agree to furnish rooms for headquarters, badges, programs, convention hall, and stenographer, if desired, free of expense. We will further agree to royally entertain all attending delegates and their wives. We would suggest a theater party one night, open house at the social clubs, a dance for the younger element one evening, and a banquet the last night at the leading hotel. If it should happen that there is snow on the ground, we will have a hayrack sleigh ride. These are some of the forms of entertainment that we can offer, and I can assure you that they will be strictly first-class in every respect, and free to all delegates. Our hotel facilities are good. We can take care of five or six hundred people, and while we might not draw as large a crowd at Lafayette as we would at Chicago, the session of the convention would be better attended and business transacted for the reason that the program would be arranged so that business would be disposed of before we took up the entertaining features. You can assure them that if your committee will act favorably in this matter, that we will commence at once going over our mailing list and pounding it perpetually until December 10th, with a view to making it the largest Independent Telephone Convention that has ever been assembled in the United States, and if we meet with the same proportionate success as we did upon the State Convention held here two years ago, it is now an assured fact.

Kindly give this your early and earnest attention, and advise as to your decision in the matter.

Yours truly,

STERLING ELECTRIC COMPANY,
By W. E. Doolittle, President.

WELL KNOWN HEADS OF WELL KNOWN HOUSES

F. C. Manning, vice-president and secretary of the Sumter Telephone Manufacturing Company, Sumter, S. C., first permitted his rare personality to become generally known, when the Southern Independent Telephone Association held its convention at Charleston, March 19, 1902. Delegates attending that meeting were impressed by the splendid hospitality extended to them, but among the many clever gentlemen having the ceremonies in charge, none were more pleasantly remembered than Mr. Manning.

The subject of this sketch has been connected with the telephone business since 1887. He is one of the sturdy sons of the South, where affability, sunshine and Sumter telephones have become permanent and reliable fixtures. And to a large extent Mr. Manning is personally responsible for the latter condition, always lending his assistance to the continuation of the other elements named. During the past summer the Sumter company has added twenty thousand square feet of floor space to its plant, which has been occupied with every known convenience to increase the factory output. The company's prospects are most flattering and the success of the enterprise reverts to the extraordinary ability of its officers. Mr. Manning is at present calling upon some of the customers who know and appreciate the value of his apparatus. The trip will extend through a number of states, touching Chicago as the most northern point; St. Louis in the West and including many points in Texas and the South.

F. C. MANNING.

Flashes From the Pilot Lamp

SUBSTATION WIRING AND EQUIPMENT.

Substitution wiring is a feature of telephone work that, more than any other, requires uniformity. While plants are small the necessity for this does not always appear to the management, but when upward of 1,000 miles of irregular wiring is scattered throughout a city it is forced upon them. A general outline of this subject is submitted.

PROTECTION—ELECTRICAL.

The National Board of Underwriters regard all telephone wire leading up to the fuse as subject to the rules for wires carrying currents at 600 volts potential. Therefore the best place for the location of fuses is just before entering a building. The wires from the fuse to the sub-station apparatus can then be handled in a much less expensive manner, affording opportunity for better appearance in the finished work. Triple conductor wires should not be used when the third wire is a ground from the lightning arrestor. This ground should be as direct as possible and run separately, care being exercised not to put it under metallic cleats or staples with the other conductors.

PROTECTION—MECHANICAL.

All wires should be protected against fire doors and ladders and should be attached to permit of no abrasion. They should enter the building, if aeriel wire, through holes bored upward from the outside where possible. The use of tubes, while not always possible or advisable, may be substituted by an ample application of good rubber tape.

WIRE.

The wire used should depend upon the nature of the work and a better grade of insulation must be used in damp places or places where it is liable to be damp.

Probably the best wire for moisture-proof work is a twin rubber wire with a protection covering of lead. This wire is used extensively by the larger companies and can be drawn into ducts and manholes when necessary, or even laid in water.

The use of wire with jute or other absorbent material in the covering should always be avoided for damp places. For dry places a cheaper wire can be used, though there is no investment that pays the telephone man better than good wire well put up. A very good wire consists of a silk and cotton twist upon No. 20 copper wires twisted together, one convolution in every three inches the whole being covered with a linen braid and colored to meet the code adopted by the company. A standard of color should be used exclusively where the wires of different companies are run in the same molding or shafts.

SUPPORTING WIRES.

The manner of supporting wires varies greatly and should be governed by conditions. For buildings of mill construction small wood cleats are probably the best. Saddle staples are the best for doing neat work when moldings are not permissable.

The practice of running wires under floors or on ceilings to reach portable telephones should be restricted, for such work usually involves a high maintenance expense and creates dissatisfaction to subscribers, due to frequent disorder.

In branching off from main lines for extension telephones and party lines these connections offer a constant source of trouble. The splices must be opened frequently in testing for crosses and grounds by repairmen who often do temporary work, intending to go back and make them permanent after they have found the trouble, but who fail to do so. Sooner or later the lines are all cut up and rewiring becomes necessary. A plan which would mitigate this trouble would be to use test blocks at the junction points, but this still admits a cause for trouble from loose contacts, whether screw or soldered connections are made. Good soldering requires some degree of skill, which is not possessed by every repairman.

INSTRUMENT MAINTENANCE.

It has been the aim in all telephone development to reduce the chances of trouble in the instrument to a minimum. The manufacturer, to gain the favor of the telephone engineer and buyer, is the one who has reduced the number of telephone parts, and has eliminated the weak points. The concealing of cords and cord tips was effort well directed. Diaphragm guards for transmitters and receivers are also commendable points. There have been many attempts to use the switch hook to perform additional functions, but thus far, fortunately, it has met with failure. The switch has an important function of its own and with this function well performed we should be satisfied. The use of portable desk telephones increases the maintenance cost to some extent, varying with the design of the device, but as the satisfaction to the patron is doubtless increased in greater proportions, their use is advisable. The main reasons for their increasing the cost of maintenance is the possibility of damage from falling, and also the twisting up of the connecting cords; this can be overcome if the companies will encourage the use of a good telephone support to fasten to the desk or near it—one that will not get out of order readily or wear out at the joints. If a good support could be found it would pay the companies to distribute them at cost to the subscribers.

OPERATING FEATURES.

There should be a conspicuous number plate on every telephone so that if that telephone number was requested while parties were talking it could be readily given, thus saving the time required to look it up.

The use of coin-collecting appliances and connection-recording meters are becoming an important part of the telephone exchange, and their selection should be made in view of their effect on each element in the business. They should, first of all, be rapid. One of the main points in measured rate service should be the lessening of operating expense by reducing the number of unnecessary calls. It would be illogical to increase the expense in any other direction to accomplish this. Co-operation on the part of subscribers in operating measured service devices is unreliable. Subscribers should not be asked to push buttons or pull levers. The plan of receiving the coin at the time the operator answers or that of using the coin to get the attention of central is advisable, provided she can give credit or return the coin to the depositor in the event of an unsuccessful connection.

The measured service device should have a low maintenance cost and in case it is out of order it should be possible for the inspector to examine the mechanism without coming in contact with the money. In the large systems the money is collected by regular collectors, and the inspector should not be responsible for the money in any way. The device should have separate covers for the money and the mechanism and different keys for each receptacle.

The use of a properly made token should be encouraged. There are several good reasons for this; first, the tokens

are more uniform than nickels when made of the right material and will not be so likely to stick and cause trouble; second, the rate may be graduated by selling them to the subscribers at different prices, according to the number bought, and an extra one can be added to a dollar's worth to encourage their use; third, the subscriber pays in advance for his service; fourth, the subscriber cannot circulate these as he can a coin and is more likely to have the wherewith to make a call when he desires to, and the token is, it is strange though true, of less value in his eyes than the cash, and under given conditions he will use more of the former, which results in more calls.

The only objection that could be raised to the use of tokens is that they might be used improperly, but as they are handled in one of the large nickel service systems each subscriber guarantees to redeem all tokens in the cash boxes and the company does not lose. Another plan which would protect the subscriber would be to sell the tokens in series, each series having separate numbers. Under such a plan when a token is found in a foreign box the collector would know that it had been paid for by some one else and would naturally insist upon payment from the one in whose machine it was found. If it were found that these were being counterfeited that particular series could be discontinued and instruction given to the collector not to honor that number.

GROUND CONNECTIONS.

The increasing use of appliances requiring ground connections has opened a field for a good ground clamp. A good ground cannot be easily put on a water pipe while the water is in it, and it is not advisable to use the drain pipes. Lead pipes are easy to solder, and when a gas meter is convenient a reasonably permanent ground may be made by connecting to the service side of the meter. Connection to the house side should not be made, as the meter may be removed, leaving the ground open. A ground clamp, adjustable to any sized pipe, easily attached and not unsightly, would be a great benefit to operating companies.

MICHIGAN FARMER'S TELEPHONE SYSTEM.

Farmers of central Michigan have a telephone system which they own. It is not a barn-to-house makeshift; not even a barb wire fence telephone; but a legitimate, incorporated octopus. A central Michigan farmer standing in his parlor can talk to New York city, Canada or Mexico.

The plan originated two years ago in a single line of wire five miles long. It was a private wire between Horton, Mich., and the residence of E. M. Crum, says the New York *Herald*. This line started a telephone craze. Telephone meetings were held at houses and lasted far into the night. Men, women and wagonloads of children attended them. The men spoke of talking direct to the markets of Detroit and Chicago; women told of sickness, when a quick message to the doctor might have saved a life. Old men who had not spoken in public for twenty years told what a telephone would have done in the hard winter before the war.

Capitalized stock companies were organized to build telephone lines, each company including about a dozen families, whose members were officers, board of directors, corporation presidents and subscribers all in one. They divided the distance between their respective homes according to poles, which each stockholder grubbed out of his own woods in an assigned quantity. They bought wire and telephones and set the young mechanical geniuses who were bent on making "flyin' machines" at something useful.

A ring on one telephone being heard in every house on the line, the farmers invented a Morse telegraph code of telephone rings. Each family was given its own distinguishing combination of long and short rings. Of course, any one could listen to his neighbor's conversation.

Experience proved every subscriber human. Each one made mistakes—each one was in the position of the absent-minded minister who mistook a ring for the saloonkeeper as his own and received an order from the deacon for a keg of beer. Some companies were family lines, including only blood relations—fathers, grandfathers and great-grandfathers.

The second step in the telephone system was when switchboards connecting half a dozen companies were installed in the country mills, and the mills were connected with each other. At present near Jackson this consolidated farmers' telephone covers forty square miles and includes 100 families.

A nominal sum is paid the miller for acting as telephone girl. The switchboard occupies the same place in the miller's business as his family truck garden, and is more profitable. His wife and children help tend the telephone, just as they formerly helped pull weeds and "bug" potatoes. Furthermore, the telephone is the more congenial work, since the miller's wife and children can learn more in ten minutes at the telephone than in a week's contemplation of potato bugs.

At present the farmer's telephone is undergoing a third step in transformation—a reduction in the number of houses on a line and an increase in the switches at the mills.

The largest "central" is at Liberty, Michigan, where nine lines converge at the mill and where the business of the town has been remodeled to fit the new-fangled telephone. The general store, owned by a former Methodist minister, now takes its orders almost exclusively over the telephone and delivers them according to the line on which the order was given, each line having its particular day of the week for the delivery of its own orders.

Other prosperous lines are the Somerset Center, Cement City and Choate companies. The last two have metallic circuits. The stockholders in place of profits receive special privileges, none but a stockholder, for instance being allowed to put on an extra telephone without asking permission. Outsiders usually pay a fee of $15 for joining a company, though they sometimes enter free, except for buying a telephone.

The farmers' telephone, while still imperfect, has become a necessity in central Michigan. Farmers use it to transact their business. It keeps them posted on daily fluctuations in prices. Buyers no longer travel about among farmers, but purchase stock and produce over the telephone.

ANNUAL REPORT OF COMMISSIONER OF PATENTS.

The commissioner of patents has published his report for the fiscal year ending June 30, 1903. From it we gather that there were received in the last fiscal year 49,199 applications for mechanical patents, 801 applications for designs, 156 applications for reissues, 1,767 caveats, 2,530 applications for trade-marks, 1,208 applications for labels and 362 applications for prints. There were 29,892 patents granted, including reissues and designs, and 2,194 trade-marks, 910 labels, and 233 prints were registered. The number of patents that expired was 23,390. The number of allowed applications which were by operation of law forfeited for non-payment of the final fees was 4,760. The total receipts of the office were $1,591,251.04; the total expenditures were $1,423,094.40, and the surplus of receipts over expenditures, being the amount turned into the treasury, was $168,156.64.

Such has been the increase in the amount of business that the commissioner strongly recommends that an appropriation be made for the establishment of a new division to handle the increased work. By the appropriation bill of April 28, 1902, an increase of thirty-five examiners and three clerks was made. A still larger clerical force now seems necessary. At least ten new clerks will be required.

Co-Operative Telephone Company of Detroit

The opening of the Co-operative Telephone Company's exchange once more establishes Independent telephone service in Detroit and gives service to many surrounding towns over the various Independent toll lines.

Notwithstanding that there are over 40,000 telephones connected with more than 600 Independent telephone exchanges or toll line stations in the state of Michigan, outside of Detroit, and nearly 400 towns that can be reached only by Independent telephone lines, the fight with the Bell company in Detroit has been one of the hardest in the field; made so by the sale to the Bell of the Independent system of the New State Telephone Company. Under Bell management, the service on this so-called Independent system was allowed to run down and finally become practically useless, leading the general public to believe that but little could be expected of any system outside of the Bell, and gave the city council and officials a good reason in the eyes of the public for refusing to grant a franchise with reasonable privileges for the establishment of another competing telephone company in Detroit.

Although the number of telephone users had been increased during the period of telephone competition, four or five times, the Bell company gradually forced all telephone subscribers to use its instruments at a great advance in rental, with a view to discontinuing the service on the once Independent system and again establishing a monopoly.

After the citizens had witnessed a number of unsuccessful attempts to secure a telephone franchise from the city to establish a competing company, a number of the most prominent and public-spirited business men started a movement early last year to establish an Independent plant along the co-operative plan.

A franchise was granted the Co-operative Telephone Company allowing a charge of $48.00 for business telephones and $24.00 for residence telephones at which rate party-line service may be given. The franchise allows the use of the city's conduit system, pole lines and public buildings upon a purely maintenance basis, which provision is of considerable advantage, the city owning its municipal lighting plant covering the entire city with its conduit system and pole line. A provision is embodied in the franchise which prevents its being absorbed by the Bell company.

Under the company's organization a subscriber for a business telephone also subscribes for at least one share of the stock at the par value of $50.

In view of the strong efforts being made by the Bell people to discourage investors in Independent systems, it could not be hoped to at once establish a system covering the entire city upon this basis, and under these conditions, so it was decided by the management of the Co-operative company to at first open a businessmen's exchange in the downtown district to establish Independent service between the more than 40,000 Independent subscribers throughout the state, with the wholesale houses, hotels and other large business places, to thoroughly demonstrate to the people the value of Independent connections and in this way to once more bring Detroit into the Independent fold. The company soon had a sufficient number of business subscribers to warrant opening the fight against the Bell company, and contracted with the International Telephone Manufacturing Company of Chicago for a 12,000 capacity lamp signal central energy multiple switchboard equipment, with an immediate installation of four sections. The complete equipment, including the long distance central energy telephones, was furnished by the International company. The exchange is located in the Golden Block, 32 Michigan avenue, and allows for extending space to make the necessary increase.

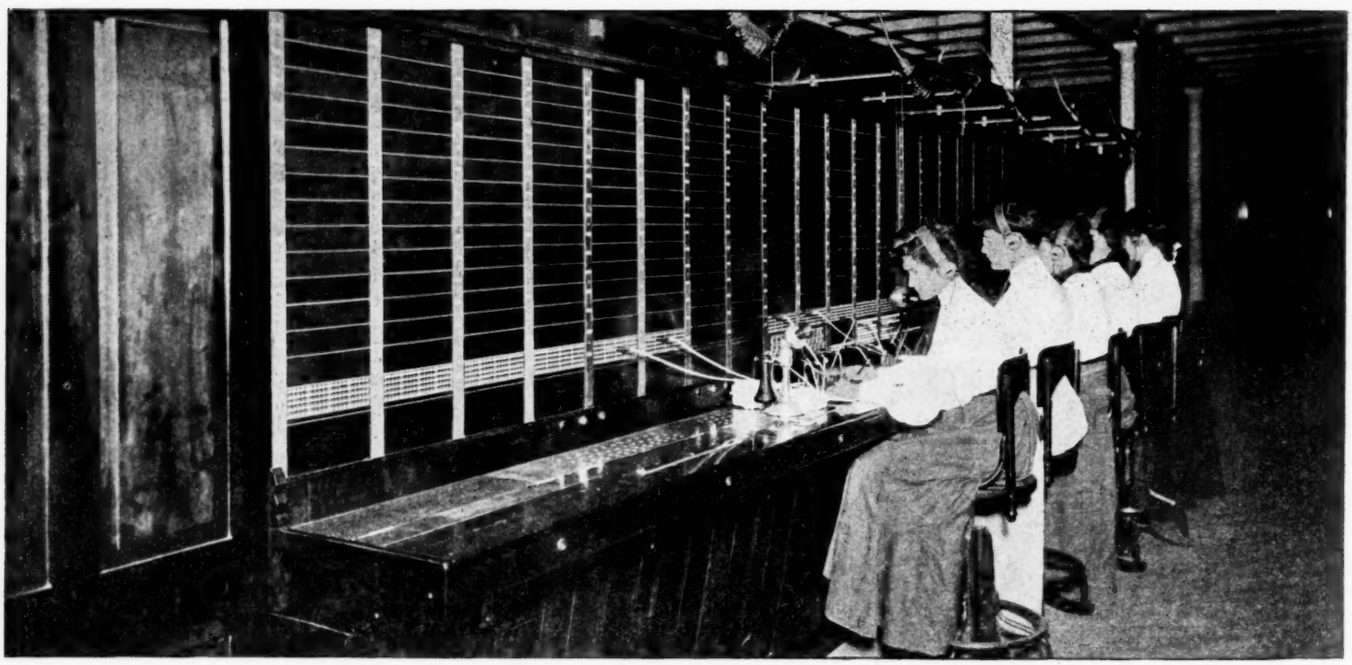


FIG. 1.—MAIN SWITCHBOARD, DETROIT BUSINESS MEN'S TELEPHONE EXCHANGE.

Figure 1 shows four sections of the original installation of switchboard. The board is constructed in sections with

a capacity for installing the necessary multiple jacks for the ultimate equipment of 12,000 subscribers' lines. The sections are built of heavy architectural iron and are firmly braced to make them strong and rigid. The cabinet-work is of heavily polished, dark mahogany. The plug-board and the pilot lamp panel, back of the plug board, are covered with mahogany-stained heavy belt leather, one-eighth of an inch in thickness. The first position is provided with the necessary multiple jacks as an annex to the second position. The second and third positions are arranged for installing

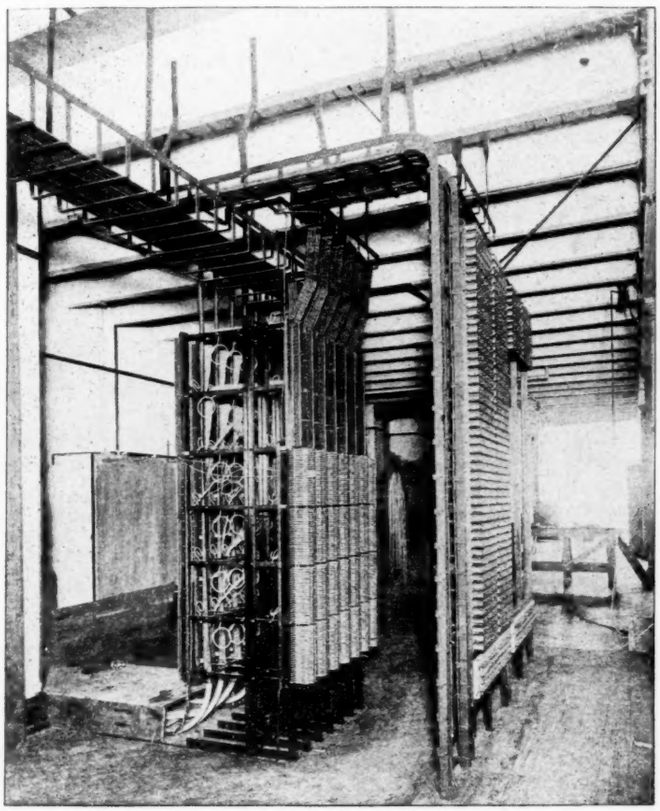


FIG. 2.—DISTRIBUTING RACK.

the necessary incoming trunk line equipments. The fourth position is equipped for twenty long distance toll lines and arranged as extensions for a main toll board. The remainder of the board is equipped for regular city exchange lines. The toll line signals are high wound tubular drops, with drop shutters of the regular size. The local subscriber's line signals are a one-third candle power lamp mounted in an opaque tube provided with a small opalescent jewel, set in a shouldered brass cap, to allow it to be readily inserted into its socket or removed from the front of the board. The lamp signal jacks are arranged in banks of ten and are mounted in hard rubber strips provided with a well-braced brass rail support. The banks of lamp jacks are so constructed that they may be readily installed or removed from the front of the board. Alternating with the strips of lamp jacks and correspondings in number, are mounted the necessary answering jacks. The answering jacks are arranged in banks of ten and are constructed with their springs firmly clamped in strips of hard rubber and securely supported by a front piece of a heavy brass rail, provided on its front and back with strips of hard rubber perfectly insulating the ferrules of the spring jacks from the frame. The multiple jacks are arranged in banks of twenty, mounted on three-eighths inch centers, with the construction of the banks the same as the answering jacks, making the banks very strong, rigid and durable.

Each operator's position is equipped with a long distance transmitter and are adjusted to avoid taking up side-tone as much as possible, to prevent subscribers hearing operators in adjoining positions. The operators' receivers are provided with a cord and plug so they may be attached and detached at a cut-in jack in each position, mounted underneath the key-shelf. The key-shelves are constructed of five layers of the wood of which the board is constructed, glued together, the grain of the two outside and central layers running lengthwise and the grain of the other two layers running crosswise. The ringing and listening keys are mounted on the bottom of the shelves with the lever passing through the shelf, supplied at the top with a proper nickel-plated brass sliding escutcheon to prevent dust entering. The sets of ringing springs and listening springs are mounted one above the other, firmly clamped in a hard rubber block. This arrangement of the springs allows the use of heavy and long springs to prevent their breaking and make a small and compact key to enable mounting the required number in one line in each operator's position. The key-springs are of the best German silver and provided with genuine platinum contacts. The keys are constructed with the terminals of both the ringing and listening set at one end, enabling making all connections from one side with one key cable, leaving the springs and contact points open and free for convenient inspection.

The supervisory clearing-out lamps, one for each board,

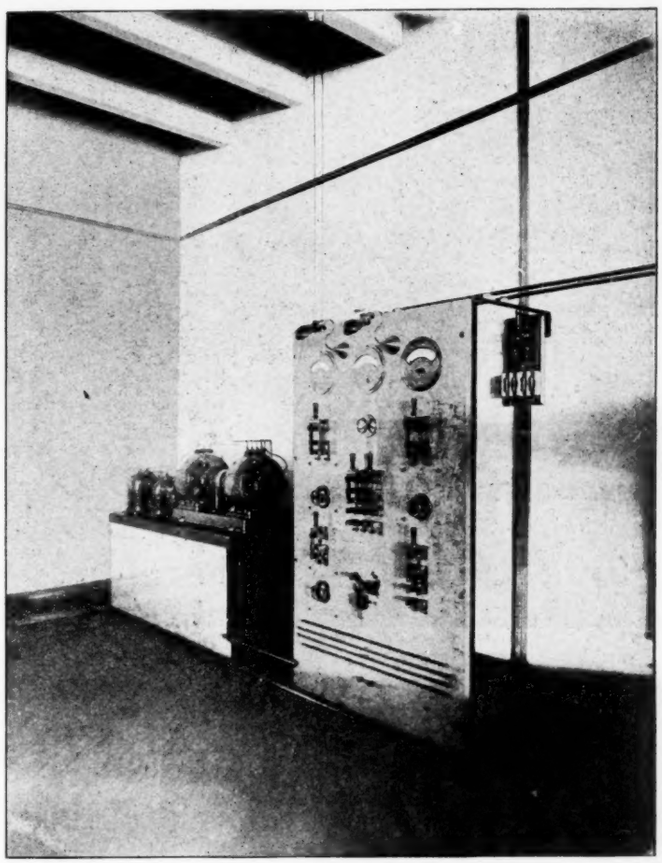


FIG. 3.—POWER PLANT.

are mounted on the plug board between the plugs and the keys. The clearing-out signals consist of one-third candle power lamps, mounted in an opaque tube similar to the line signal and provided with an opalescent jewel, set in a shouldered brass cap, supplied with an arched wire guard to prevent the breaking of the opal from impact of the plugs and also provide the means for conveniently removing the lamps from the top of the board without the use of special tools. The supervisory lamp sockets or jacks are mounted indi-

vidually on the bottom of the plug board. The clearing-out lamp opal with guard, is so constructed as to prevent the accumulation of dust.

The plugs are made small and compact to allow two or more being placed in adjoining multiple jacks, mounted on three-eighths inch centers. The sleeve of the plug is of black polished hard rubber and is mounted so as to allow its turning on the shank, to avoid twisting the plug when inserting.

Each equipped operator's position is provided with three pilot signals, one for indicating in connection with the subscriber's line signal, one to show in connection with the supervisory clearing-out signal and one for use in the ringing circuit. The pilot signals are one-third candle power lamps mounted in an opaque tube, provided with large brass cup receptacle into which is mounted the colored prism bull's eye. The pilot lamp sockets are so constructed that they

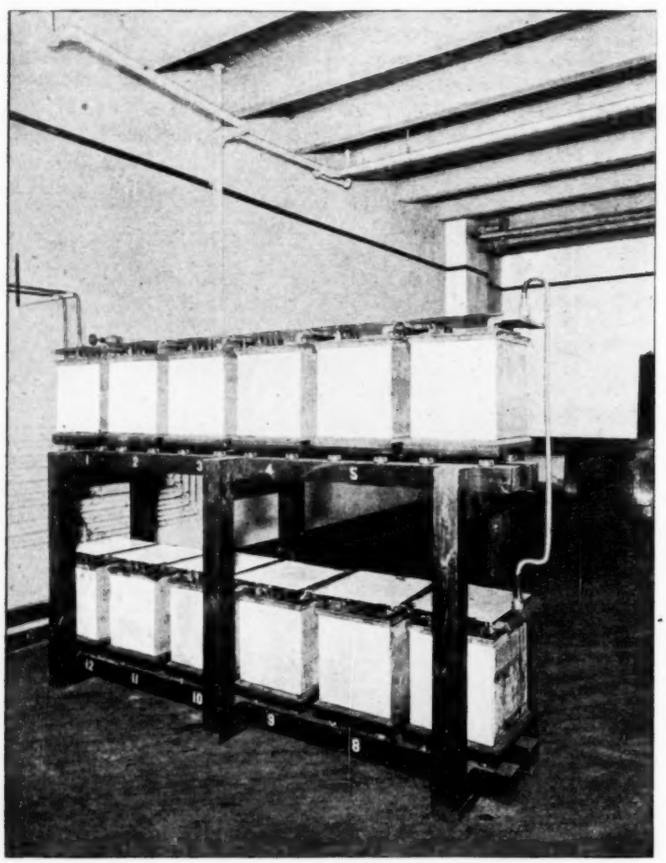


FIG. 4.—BATTERY PLANT.

may be readily removed from the front of the board, the same as the line or clearing-out signals.

These arrangements of the ringing and listening keys, lamp signals, lamp jacks and spring jacks leaves all working parts readily accessible for inspecting and testing from the front of the board.

Figure 2 shows the distributing board with lightning arrester board and relay rack for the original installation of 600 lines. The line side of the distributing board is arranged with immediate capacity for 800 pairs of cable. On the switchboard side of the distributing board are mounted 700 pairs of carbon lighting arresters with self-soldering coil protectors. The relay rack is divided in sections for 500 lines to the section. The rack is constructed of heavy architectural iron, well braced to make it strong and rigid. The relays are mounted in strips of ten. They are constructed with an iron-clad shell completely enclosing the winding in iron when the armature is drawn up. The springs are constructed of the best grade of spring German silver and are of ample length to insure accuracy of their operation. All contacts are provided with genuine platinum. The relays are so constructed and mounted that they may be readily removed or inspected. In addition to the iron shell, the complete relay is individually enclosed with a heavy brass tube or cap, screwed onto a threaded base, thus absolutely avoiding any possibility of rust or dust entering the working parts. At the bottom of the relay rack is mounted a heavy marble slab containing fuses for the leads to the relays to properly protect the coils. The cables from the relay rack and the distributing board are run to the switchboard on a strongly constructed iron cable chute or rack, well supported and braced to make it strong and rigid. The distributing board and relay rack are so constructed that they may be extended at any time up to the full ultimate capacity of the exchange.

Figure 3 shows the power switchboard, charging machines, and main and intermediate ringing machines. The power board is built of a heavy marble slab, supported by an architectural iron rack of strong and rigid construction. It is provided with the necessary ammeters, volt-meter, volt-meter switch, circuit breaker, starting boxes, field rheostat and the necessary double pole copper blade knife switches for properly controlling the system.

Figure 4 shows one set of the battery plant, consisting of twelve cells of lead-lined tank chloride accumulator storage batteries. The battery leads and bus bars are of copper and of sufficient size to insure against cross-talk. All cables used in the switchboard and the cables from the rack for main distributing to the relay frame, and from the relay frame to the rack for intermediate distributing, and from the rack for intermediate distributing to the multiples in the switchboard and from the rack for intermediate distributing to the answering jacks are all of No. 22 B. & S. gauge tinned, annealed copper wire, 98 per cent pure, covered with two layers of silk and one of cotton, with the outside layer of cotton colored in accordance with a predetermined color code for facilitating handling and testing the lines. Sufficient length of wire is used at the spring jacks so that the banks can be taken out for inspection, leaving the signals and all other apparatus in their proper place. Wiring of the power circuits and storage batteries is of the best quality of rubber-covered wire, of sufficient size to fulfill the requirements of the National Board of Fire Underwriters.

The telephones used in the system for the local and the Inter-State toll line work, are of the International long distance type.

The co-operative exchange has recently been connected, through the toll lines of the Peninsular Telephone Company of Detroit, with the other Independent lines of the state, once more opening telephone communication with Detroit to the 40,000 Independent telephone subscribers in Michigan, as well as the Independent systems throughout the other states.

The company, while it has just opened its toll line connections, is having a heavy long-distance service from the Independent exchanges throughout Michigan and surrounding states. Among the first long-distance connections over the new Independent lines one which shows the value as well as quality and efficiency of the service was a conversation from one of the stations in Detroit with the Grand Rapids exchange, carried on continuously and uninterruptedly for two hours and fifteen minutes, the regular toll charges amounting to nearly $10.

It is expected that the toll service will constantly and rapidly increase when the 40,000 and more Independent telephone subscribers in the state, outside of Detroit, and the subscribers in the Independent systems in the surrounding states know that they can secure telephone service with Detroit over their Independent lines.

DECISIONS AFFECTING TELEPHONY

BY G.W. HAND

TELEPHONE COMPANIES ARE COMMON CARRIERS IN INDIANA.

Judge Artman of the Boone circuit court has decided the case of the state of Indiana ex rel Thorntown Co-operative Telephone Company vs. The Lebanon Telephone Company, in which the former sought by mandamus to compel the latter company to connect the switchboards of the two companies on the same terms that the Lebanon company made connections with other companies. The application of the Thorntown co-operative company was turned down and suit was brought to force the desired connection. The controversy turned directly on the question whether a telephone company is a common carrier and may, or may not discriminate between companies seeking the connection which was sought in this case. The defendant company objected to the complaint of the Thorntown co-operative company, but Judge Artman held it good and later held the answer thereto insufficient and unsatisfactory. These rulings practically admit the right of the plaintiff company to the claim which it makes for connection, and establish the rule in the state that telephone companies are common carriers. It will be interesting to note the result of the appeal of this case to the higher court where the decision of Judge Artman will in all probability be carried by the Lebanon company. If sustained the decision will make the telephone companies of the state in a great measure subservient to public demand for connections of this character and if carried to its farthest application discloses no good reason why an individual could not force telephone companies to make telephone connection for the purpose of transmitting messages much in the same manner that railroads are by law required to carry baggage and accept the same from one line to another. The decision is of the utmost importance to the several companies throughout the state and the review by the higher court will be watched with a good deal of interest.

Case decided September 29, 1903. Boone Circuit Court, Indiana.

LITIGATION BETWEEN KENTUCKY COMPANIES.

The East Tennessee Telephone Company recently sought from the Bowling Green circuit court a restraining order to prevent the Southern Electrical Construction Company from placing its poles on the same side of the street with the former company. The application was overruled and a final hearing of the points in controversy will be had at the November term of court before Judge Bradburn.

In Circuit Court, Bowling Green, Ky., case pending.

A NEW FIELD FOR DAMAGE SUITS.

The supreme court of Massachusetts has given a decision in the case of Jerimiah Riley vs. the New England Telephone and Telegraph Company, in which it holds that if a person in passing a telephone pole and in the exercise of due care is injured by striking against the pole in the street he may have recovery from the company, notwithstanding the fact that the company was in no wise negligent. The ruling is based on the ground that the use of the streets for placing of telephone poles is an extraordinary use of the same and that the companies maintain them in this unusual place at their peril. The ruling throws the entire blame on the companies and apparently the only remedy by which they may escape liability is to prove carelessness on the part of the injured person.

In the above case Riley was driving along Bridge street, and while passing a telephone pole the wagon in which he was sitting gave a sudden lurch, caused by one of the wheels dropping into a hole. Riley was thrown out and against the pole, from which severe injuries were sustained. The pole was properly located and had received the sanction of the municipal inspection. At the trial the company had a verdict, but on appeal the case was reversed, Chief Justice Knowlton saying: "The statute creates a liability without any reference to negligence. The legislature seems to have recognized that the erection of the poles and fixtures in public ways would create obstructions that might interfere to some extent with the use of the public streets and increase the liability of travelers to accidents. Such obstructions, whether placed in a sidewalk or in a part of the street designed for use of vehicles, being there when the streets are lighted and when they are in darkness and in every variety of possible conditions, subject persons in the exercise of due care to risks which do not otherwise exist." One of the justices, however, dissented from this opinion. The prevailing opinion of the court was based on an interpretation of a state statute.

Jerimiah Riley v. New England Telephone and Telegraph Co., 68 N. E. 17.

DAMAGES FOR ONE-FOURTH THE AMOUNT.

A jury at Elkton, Md., has awarded John Gordon a $500 judgment in a suit by him for $2,000 against the Maryland Telephone and Telegraph Company for injuries received by falling over a telephone pole belonging to the company.

HOUSE MOVER MUST PAY DAMAGES.

In the district court at Grand Forks, N. D., the Northwestern Telephone Company brought suit for damages against E. B. Anderson, a house mover, for the cutting of certain telephone wires while engaged in moving a building in that city. The case in the district court was decided in favor of the telephone company and damages were awarded for the injury alleged to have been done. Anderson has appealed the case and on the date of September 25 the cause was submitted to the supreme court. The decision of the lower court is in accord with the Michigan statutes, as noted in a recent number of TELEPHONY.

TELEPHONE NUMBER AN ASSET.

In an action for an injunction by Thoman & Stump, a grocery firm of Columbus, Ohio, which had bought out the business of D. D. Tressenrider, to restrain the Citizens' Telephone Company from moving the telephone number to Tressenrider's new place of business, Judge Dillon has decided that the telephone number is an asset and that the number cannot be moved from the old place of business. The new firm bought the business which Tressenrider had established, and when the latter wanted to take the telephone to his new place of business objection was made on the ground that the number was known to the patrons of the old business, and since Thoman & Stump had purchased "the business" the deal included the value of the notoriety of the

telephone number. The claim was made that a change would work an injury to the business, and this view was upheld by Judge Dillon, who permanently enjoined the telephone company from making the change.

NEGLIGENCE OF REPRESENTATIVE OF MASTER CAUSING INJURY TO LINEMEN.

One Tanner was employed by the New York, New Hampshire and Hudson River Company as a lineman in transferring wires to a new set of poles from old ones, which had to be abandoned on account of their decayed condition, and climbed one of the defective poles for the purpose of throwing down the wires from the cross arms. When Tanner threw down the wires they fell across a wire guy connecting the pole with a fence near the pole. Tanner asked an overseer at the foot of the pole on which Tanner was at work what should be done. The overseer instructed him to cut the guy wire, which he did, when the pole fell, carrying Tanner to the ground and injuring him, from which he began suit against the company under the employer's liability act. The court held, according to American Negligence Reports 13, 499, that, assuming that the overseer was a superintendent within the meaning of the act, and that his direction to cut the wire was an act of superintendence, the plaintiff could not recover, because the risk of the falling of the decayed pole was one that Tanner was bound to know about, and a risk which he assumed in accepting this particular employment; that his question to the overseer was not whether it would be safe to cut the guy wire, but was rather what the overseer wanted next done, and that it could not be found that the instructions of the overseer to Tanner amounted to an assurance that it was a safe proceeding to cut the wire. In the lower court the plaintiff had a verdict, but on the appeal the superior court sustained the exceptions of the company and reversed the case.

Tanner v. New York, New Hampshire and Hudson River Company, 180 Mass. 572.

INJURY FROM NEGLIGENCE.

It will be noted that in the above case the points on which the Massachusetts court reversed the decision of the lower court were, first, that the plaintiff, Tanner, was charged with knowing that the pole was in an unsafe condition and, second, that the instructions of the overseer to him were not a warranty that the pole would not fall when the wire supporting the pole was cut. In the following case decided by the Nebraska court, the plaintiff, a lineman, complained to a foreman who had charge of the work of removing arc lamps in connection with another employe that the ladder was too short, that it should be extended further, which could have been easily done, and was told by the foreman that it was high enough and directed Baldwin to ascend. The lineman went up and while there the foreman let go of a rope that held down the wire against which the ladder rested, and the wire springing up past the end of the ladder, it and the plaintiff were thrown to the ground and he was severely injured. The court in this case held that the foreman was a vice-principal and his instructions to the lineman that it was safe to make the ascent of the pole after the lineman had called attention to the fact that the ladder was too short was such negligence on the part of the foreman as would make the company liable for the act of the foreman as a vice-principal.

New Omaha-Thomson-Houston Electric Light Co., v. Baldwin, 62 Neb. 180.

LIABILITY FOR INJURY.

In a case decided in June, 1902, in the New Jersey court of errors and appeals the New York and New Jersey Telephone Company were sought to be held liable by one Knutter on the ground that he had been injured by the negligence of a foreman, Runyon, while engaged in the performance of his duties as a lineman in the employ of the company. At the time of the occurrence of the accident Knutter was engaged with others in the act of putting up wires in the streets of Somerville for the purpose of making a connection between the residence of a subscriber and the central exchange. Runyon was a member of the party engaged in this work and had general charge as a foreman, and in addition took active part in the work of putting up the wires. From his own evidence his duties were "to overlook all the work and help out if the men were pushed." The accident occurred while the party was endeavoring to get a wire through the limbs of a tree, the limb breaking and throwing Knutter to the ground. In order that the wire might be placed in its proper position Runyon ordered Knutter to ascend the pole in question, from which he stepped into a neighboring tree about twenty-five feet from the ground. Runyon then threw the wire over the limb of the tree on which Knutter was standing and instructed him to place it in position. Knutter was endeavoring to obey these instructions when suddenly Runyon, without warning to Knutter, pulled on the wire, with the result that the limb broke with the above consequences. Suit was thereupon begun against the telephone company and in the lower court the plaintiff had a verdict.

The defendant company carried the case to the higher court on the claim that Knutter and Runyon were engaged in a similar employment, and hence the company could not be held in damages on the familiar principle that the two were fellow-servants engaged in a common employment, so that for the negligence of the overseer or foreman the master could not be held liable. The court in discussing the question said that in order to hold the company liable it must hold that by reason of Runyon being a district manager in general charge of the work and engaged in general supervision of the work, "with power to employ and discharge subordinates, and being at the same time in direct command of the work in which the plaintiff was engaged, became the representative of the defendant, its vice-principal or *alter ego*, in such a sense that the company was liable for his negligence."

The court said that the only ground that the company could be considered in fault was on the ground of the "superior servant rule." This rule is based on the doctrine that the master is liable to a servant who sustains injuries through the negligence of a person in superior grade as a general superintendent or department manager. At the trial there was no dispute as to the fact that Runyon was a person ranking in superior command, but the court disposed of the proposition on the basis of the New Jersey decisions, which, it said, in no case allowed recovery in personal injury cases on the ground of the "superior servant rule." While Runyon was acting in a position of supervision over the plaintiff, yet he was doing acts of a general character incident to the general work of stringing the wires, and the rule of fellow-servant was bound to prevail.

In passing it is important to understand the general rule which the courts have made to determine when one employe is to be considered a fellow-servant of another. While, as a matter of fact, in practice, each case practically stands by itself and is a question of fact for special adjudication, the rule is itself plain. Judge Dillon, in 24 Am. Law Rev. 189, has said that the line of liability is fixed by the "master's personal duties toward his servants. As to these the servant who represents his master is what we may, for convenience, call a 'vice-principal,' for whose acts and neglects the master is liable." This may perhaps be stated in another way by saying that where the master owes the servant a duty to do any particular thing, the failure to do which would make the master liable if he were personally supervising, will equally make the master liable if the particular duty is delegated to a superintendent or general manager. To refer again to the New Jersey case, the appellate court did not believe that

there was any failure on the part of the foreman, Runyon, to do a duty which devolved on the company, but that the accident was the result of error in judgment of one carrying out the general instructions and doing the general work of the business in which the party was engaged. The two were in a common employment and Knutter assumed the risks thereof.

Knutter v. the New York and New Jersey Telephone Company, 12 Am. Neg. Rep. 109.

DAMAGE SUIT AGAINST AN ILLINOIS COMPANY.

George W. Talley, Lincoln, Ill., has begun suit against the Central Illinois Telephone and Telegraph Company to obtain damages to the amount of $5,000, which he claims he is entitled to as a result of injuries which he received March 19, 1903, while employed by the company as a lineman. While in the discharge of his duties he claims he received a severe shock from a street car company's wire for which he says the telephone and telegraph company is liable. As a result of the shock he fell from the pole on which he was working to the ground causing the injuries.

Case pending.

TELEPHONE SUBSCRIBER SEEKS TO MANDAMUS THE MICHIGAN BELL.

In July last, Dr. T. N. Rodgers and other telephone users at Sault Ste. Marie, Michigan, determined to test the validity of an ordinance passed by the city council a little over a year ago fixing the rate for telephone service at $12 for domestic and $24 for office. At the present time the Michigan Bell, owing to its absorption of the Independent company of which Dr. Rodgers was a subscriber, is the only company in the field and has steadily disregarded the ordinance passed by the city fathers. Notice was given to Dr. Rodgers that he would have to pay the higher rate or else his telephone would be removed. This he refused to do and his telephone was taken from his premises. Relying on the city ordinance he thereupon began mandamus proceedings before Circuit Judge Steere of the eleventh judicial circuit to compel the company to furnish him a telephone at the rates fixed in the ordinance. This mandamus was denied by the circuit judge and Dr. Rodgers carried his case to the supreme court where an order was made on the sixteenth of September that Judge Steere show cause why he should not grant the mandamus asked for by the plaintiff.

Dr. T. N. Rodgers v. The Illinois Trust Co., Receiver of the Michigan Telephone Co. Case pending, Eleventh Judicial Circuit, Michigan.

RENEWAL OF TELEPHONE CONTROVERSY.

The well known telephone case of James F. Manning and other parties of Washington, D. C., against the Chesapeake and Potomac Telephone Company has been renewed, and was recently heard again before Justice Barnard of the district supreme court of the District of Columbia. The case has already been through the supreme court of the District of Columbia, the court of appeals of the District of Columbia and the Supreme Court of the United States. The hearing on August 20, was in accordance with an order from the United States Supreme Court that the District Supreme Court find exactly what was the meaning of the act of congress of June 30, 1898, which prescribed rates to telephone users of $50, $40 and $30. The United States Supreme Court asked the lower court to find the different kinds of service which the act intended to cover. Justice Barnard has announced that the opinion of the District Supreme Court will be withheld until the October session. He also withholds the privilege of taking further testimony in the matter. A prominent Washington paper states that the litigation was resumed in consequence of the fact that the proposed agreement between the telephone subscribers' association and the Chesapeake and Potomac Telephone Company came to naught and hence the litigation is renewed.

James F. Manning et al. v. Chesapeake and Potomac Telephone Company, in District Supreme Court, Washington, D. C. Case pending.

CLAIMS HE WAS SLANDERED BY TELEPHONE.

A slander suit very similar in many ways to the one noted in the October TELEPHONY has been begun by C. P. White of Wapello county, Iowa, against L. R. Garrison in that county. White resides on a farm and has a telephone connection in his residence, and in his suit against Garrison, alleges that on September 6, he engaged in a conversation with Garrison and in the conversation Garrison accused him of being a thief to the amount of $45.00. White claims that while the conversation was going on several of the neighbors were listening to what was being said over the telephone and that they heard Garrison call him a thief, and from this accusation White believes himself damaged to the extent of $2,000.00 in the estimation of his farmer friends. As was noted in the Georgia case, there seems no good reason why White may not recover damages providing he is able to prove his damages. At any rate the fact of the conversation being carried on over the telephone should have no effect in the decision in the light of the various decisions on the subject of communication over the telephone which have been noted in a previous issue.

Case pending in Wapello County Court, Iowa.

USE OF PUBLIC WAYS A STATUTORY RIGHT IN OHIO.

In Ohio there is a statute which provides that telephone companies shall have the right to occupy public ways for the purpose of erecting their lines. In a recent case in Ohio, the Home Telephone Company was the defendant in a suit to compel it to furnish service at a rate previously agreed upon between the city council and the company in consideration of a permit to the telephone company to occupy and use the streets in a certain way. The Onio courts have said that the company was not bound by such an agreement and that an injunction to prevent a reasonable charge for service within such municipality. The court which heard this case, in addition, said that inasmuch as the right to occupy public ways is conferred directly by statute, that any municipality in making an agreement with a telephone company in consideration of the right of occupancy is void for want of consideration, and one which the municipality cannot enforce for want of consideration. The court also remarked that the municipality had no such "beneficial interest" in the matter in allowing the telephone company the right of entry as would make this right of entry the subject of barter or would itself supply a consideration.

Macklin v. Home Telephone Company, 24 Ohio Cir. Ct., R. 446.

QUESTIONS OF FACT NOT SUBJECT TO REVIEW.

In a case brought before the New Jersey Supreme Court from the first district court of the city of Jersey City, in which the New York and New Jersey Telephone Company had obtained a verdict against the city amounting to $126.92, for injury to its wires and cable in a subway, and in which the trial court had found that the city workmen were responsible for the damage committed, the court said that it would not review the decision of the lower court of the question of the facts on which the judgment was given. The city was engaged together with one Van Keuren in laying a sewer along Grand street, and in digging for the sewer, according to the allegations of the telephone company, had cut the wires as above stated. The Supreme Court said that notwithstanding the fact that in its opinion there was no direct proof that the city workmen had been the cause of the damage, since the lower court had found as a matter of fact based on circumstantial evidence that

the city was responsible and had caused the injury, that the facts by this adjudication were determined and were not subject to review by the higher court. The Supreme Court also remarked that it only had authority to look to the question whether there had been "legal evidence" before the lower court on which the findings had been made. This statement covers the question of competency of the evidence; whether the conclusions on which the decision had been made had been founded on evidence bearing on the controversy. The rule of the New Jersey courts, as above laid down, is not different from the rule in the other jurisdictions, it being universally decided that when on questions of fact there has been a decision either by a court or jury, the controversy on that phase is forever settled. The determination of the kind of evidence, however, always remains an item for review.

New York and New Jersey Telephone Company v. Connoly, 54 Atlan. Rep. 219.

PLACE OF TAXATION IN NEW HAMPSHIRE.

The public statutes of the state of New Hampshire for the year 1901, impose on all telephone companies a tax on the value of their telephone lines within the state. Chapter sixty-four, section three, says that this shall include all poles, wires, instruments, apparatus, office furniture and fixtures of all kinds belonging to the companies. The next section of the statute delegates authority to the State Board of Equalization to make the assessment according to the previous section on the telephone properties. Another section in the chapter declares that the companies shall be taxed only in the mode prescribed, making a provision for the exemption of real estate which is not used in the ordinary conduct of the business, and it is further provided that this real estate shall be taxed in the town in which the real estate is situated. In a recent case by the city of Manchester to compel the New England Telephone and Telegraph Company to pay taxes on certain pieces of real estate in that city, the courts held that the real estate owned by the telephone company was made use of in the ordinary conduct of the business and as such was not subject to taxation by the city. The question turns at once upon the proposition whether the real estate in question was made use of in the ordinary business of the company, or was *not* used in this ordinary way. The New Hampshire legislature having made the statute clear, it rested only upon the court to determine the use to which the telephone company put the real estate. The courts having found that this real estate was put to an ordinary use, the taxation thereof belonged to the State Board of Equalization. The city was defeated in its effort to collect the taxes.

New England Telephone & Telegraph Co. v. City of Manchester, 55 A. 188.

DUTY TO FURNISH PROPER TOOLS CANNOT BE DELEGATED.

The North Carolina courts not long since disposed of a case in which one Orr sought damages from the Southern Bell Telephone and Telegraph Company for personal injuries on the allegation that the company had not furnished proper tools for the plaintiff's use. Orr was engaged in taking down a telephone pole and while at work and as was alleged owing to the failure of the company to furnish "spikes" and "dead men" the pole became unmanageable, fell and struck the plaintiff causing injuries for which damages were claimed. Orr based his claim for damages on the ground that the company in failing to furnish him with the above appliances had committed an act of negligence for which it was responsible for the injury; that these appliances were ordinary ones which the company was bound to furnish, and its failure in this regard was an omission of its duty to furnish safe and proper appliances, which constituted the plaintiff's cause of action against the company. The defense claimed that Orr by his action in going ahead and taking down the pole with full knowledge that the above tools were not at hand had assumed all the danger of injuries which might result from the act; that the danger was obvious and an ordinary risk of the employment in which Orr was engaged. It was further claimed that it was a danger which the company could not foresee and for which it was in no way responsible. The company also endeavored to establish the fact that Orr had been a party to his own injury by doing the work without proper tools, and that his being a party to the cause of his own injury was a bar to his right of action against the company. The court, however, ruled strongly in favor of the plaintiff saying in substance that the danger of injury in taking down a telephone pole without the use of "spikes" and "dead men" to lower it, is not so obvious that a servant assumes the risk in attempting to do the work without the use of the tools. The court also said on the question of contributory negligence that the duty of the telephone company to furnish proper tools was a continuing duty which it could not escape liability owing to the fact that the servant, Orr, had been guilty of contributory negligence. The ordinary rule of law on this point is that contributory negligence on the part of the servant is a complete bar to the right of recovery, and the above ruling seems quite out of the line of the decisions, the only exception being the case in which the servant has called the master's attention to the fact that proper appliances are not being furnished him. This failure after notice to the master, the law says, throws the entire blame upon the master for any injury due to a want of proper appliances. Without this notice of a failure to supply proper appliances, the rule throughout the United States is that contributory negligence is a bar to recovery. Various other phases of the subject might be noted, but the above practically covers the rule so far as the servant's duties are concerned.

Orr v. Southern Bell Telephone and Telegraph Company, 44 S. E. 401.

OPERATORS ARE NOT AGENTS IN TEXAS.

In a case in the Texas court of civil appeals, in which an effort was made to hold the Western Union Telegraph Company liable in a damage suit on the claim that one of its operators was an agent of the company, and as such was charged with the knowledge of the operator, the court said that the operator was not an agent, but a servant, and that the company was not liable for his acts on the rule that the master is bound by the facts within the agent's knowledge. This rule would be followed in cases in which the points were raised in actions against telephone companies and establishes a very important rule of law on this question in the Texas jurisdictions.

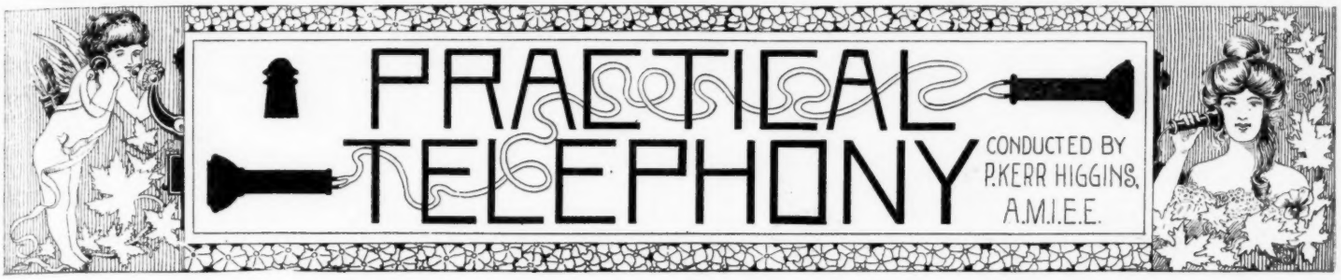
Western Union Telegraph Co. v. Wofford, 74 S. W. 943.

TELEPHONE LINES GUIDE TRAVELERS.

Telephone lines, with all their recognized advantages in ordinary commercial usages, are often employed for other purposes of a decidedly different nature and often of a quite unique and interesting character.

Frequently they serve as a guide for the traveler journeying for long distances in a strange country. When passing from one town to another he is told to follow the telephone line, if there is but one line. If there be more than one line, he is told to follow the line with the long cross-arms, or the tall poles, or the one with a certain number of wires, as the case may be.

The number of poles to a mile or the number from one town to another also aid him in determining distances. Some companies have numbered poles, and in such cases the traveler's task becomes much easier.



ARTICLE XII.

In addition to the standard equipment of an exchange there is much auxiliary apparatus, without which no exchange would be complete. This consists of chief operator's monitor's trunk, information toll, and wire chief's desks, cable and trouble records, party line equipment, break down or "hospital positions," tone test, etc. Before considering these in detail it may be well to consider a method of indicating the many changing conditions which take place daily (especially in a large exchange) such as take-outs, vacation rates, change of number, specials, etc. This is usually done by placing various colored plugs in the jacks. These may be made of cork, rubber or wood, or short paper fasteners may be used for this purpose, the latter is by far the cheapest, and under ordinary conditions will serve the purpose very well. Special conditions always require special treatment.

Party Lines and Signaling.—This is usually accomplished by arranging two separate buttons for ringing, one for each side of the line, so that in the case of a straight two-party line (Fig. 1) signaling will be accomplished by sending an alternating current out on the side of the line indicated by the number; the number in this case is usually the jack number for one side and the jack number and a cipher for the other, the numbers set aside being, when the cipher is attached, greater than any number in the exchange, e. g. an exchange having as its highest number 5,000, the first party line would begin on jack 501, the subscriber on one side of the line would have number 501 and the subscriber on the other side 5010. In some cases a master key is used, thus simplifying the apparatus. This key has two movements; forward for the jack number, and back for the other side. This makes a very simple and effective party line, and there is little or no complaint about the service. It divides the line cost and thereby increases the revenue of the exchange. This may be increased to a four-party line in two ways, selective and non-selective. In the selective (Fig. 2), the bells are polarized + and — two on each side of the line and an extra master key is attached to the position, permitting a positive or negative current to be sent out to the line at will; to this may be added the lock-out feature, which ensures privacy. The act of taking down the receiver at one station locks out all the others (Fig. 3). This is rather complicated and does not work as satisfactorily as the others. The non-selective line can have any number of stations desired, but it is poor practice to place more than two on each side, although the Bell company still adheres to the six and ten party line.

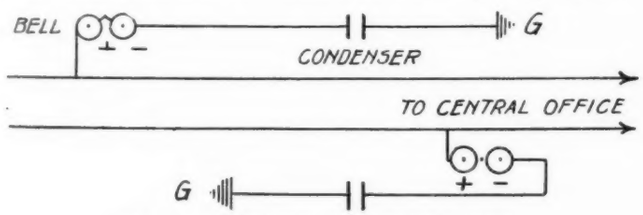


FIG. 1—SELECTIVE TWO-PARTY LINE.

When a subscriber's telephone bell has more than two rings, as a signal, it becomes a nuisance, and a loaded party line cannot be depended upon. Recently an improved, step by step, selective signaling party-line was patented and placed on the market by W. D. Watkins, which is quite effective and unique. By its use the bell at a subscriber's station never rings except when that telephone is wanted. This is produced by a step by step movement, as shown in Fig. 4. There is also added a lock-out, shown in Fig. 5. One good feature of this system is that there is no necessity for any change at the central office, except the addition of the small box, shown in Fig. 4, at the sub-station. It is very simple and as nearly accurate as could be expected. The apparatus shown is divided into three parts: The selector, a lock-out device, and the indicator. The addition of the selector requires no change in the existing apparatus, but the other two features can only be used to advantage on new systems. As will be apparent from the cut, the apparatus consists of an ingenious combination of trips, prawls, slits and cog-wheels which work smoothly, and with very little noise. The device is arranged to take care of twenty stations; but as a rule this is impracticable under ordinary conditions; the exception being party-lines in the country. The selector is usually located in a closet away from the telephone so that any slight vibration of the armature cannot be heard. The method of connecting up is shown in Fig. 6. The mechanical parts consist of an armature; two ringer spools, joined in series; two hair springs for returning wheels to normal, and a spiral spring, for releasing the armature and driving a pawl back into place. All the selectors are uniform and can be used at any station by simply moving the station indicating pawl into the desired slot. Another feature of this system worth mentioning is that all stations are cut out of the line circuit until cut in by calling. This obviates the introduction into the line of any extra resistance, other than that which would be necessary for one station. In common battery systems the condenser

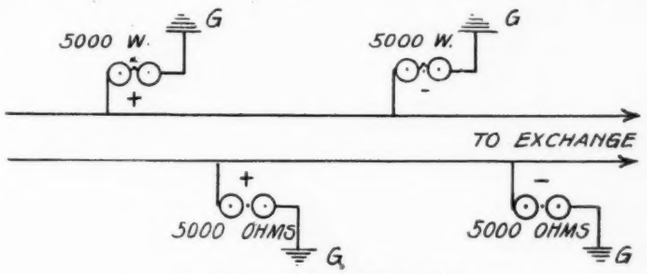


FIG. 2—FOUR-PARTY LINE.

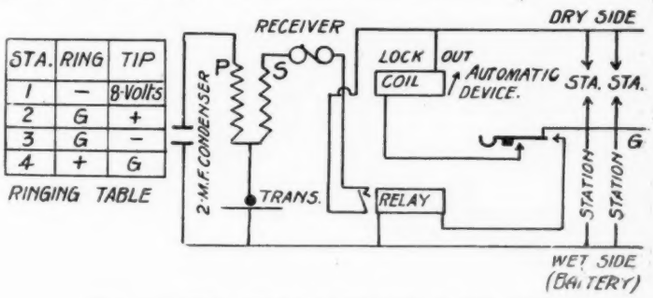


FIG. 3—BELL STYLE LOCK-OUT PARTY LINE.

would be cut in series with the ringer. Signaling on this system is done by means of short and long rings, the former does the selecting and the latter rings the sub-station, e. g., if No. 1 station is called, only one ring is necessary, and No.

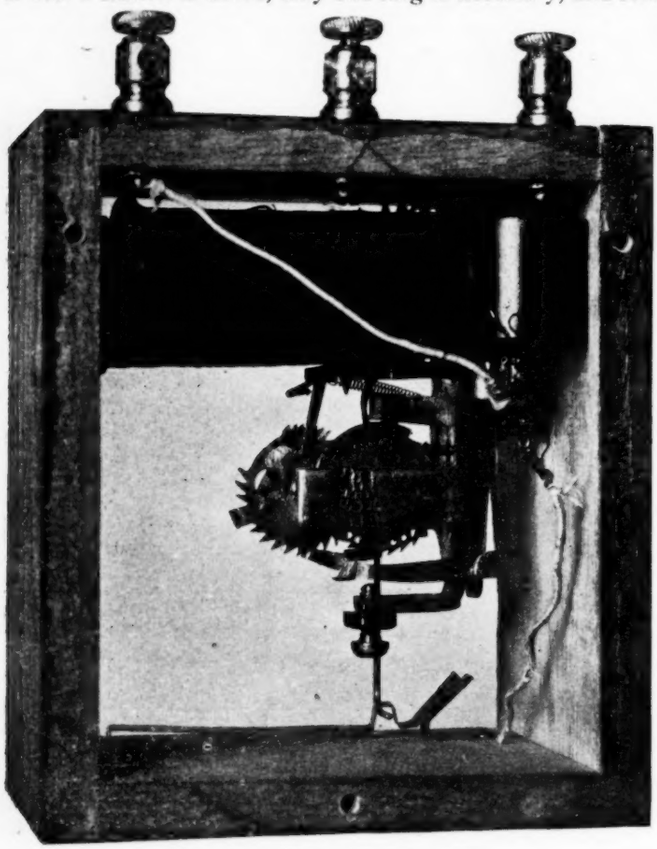


FIG. 4—PARTY LINE DEVICE.

2 station would require one short and one long ring, and so on. The numbering at central would be the same as previously indicated, the last figure indicating the number of the station. The number of rings given by the operator on such a line would be indicated on a special button at

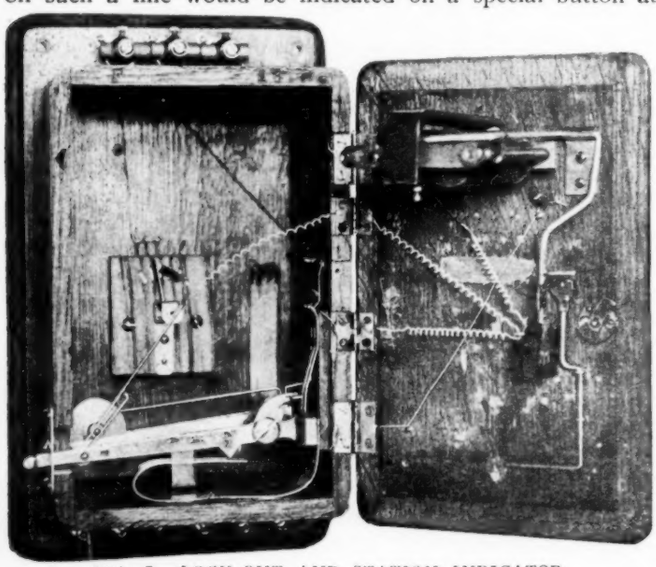


FIG. 5—LOCK-OUT AND STATION INDICATOR.

central when found desirable. The ringing must be done carefully by the operator, and while this in a measure is a drawback, it is after all only a question of training, and if found impracticable an automatic ringing key could be devised to care for this feature. The short rings operate the armature, which in turn operate the wheels and when the proper number of rings have been given, the clutch, at the station called, falls into a slit, thus cutting in the telephone proper and ringing the bell.

Lock-out Feature.—As previously stated, the normal condition of the line has all the stations cut out until cut in by central, an arrangement attached to the receiver hook and shown in Fig. 5 is operated by taking down the receiver by the subscriber. This releases a solid brass wheel which slowly moves down an incline plane, carefully suspended in the center, so that the position of the incline plane is re-

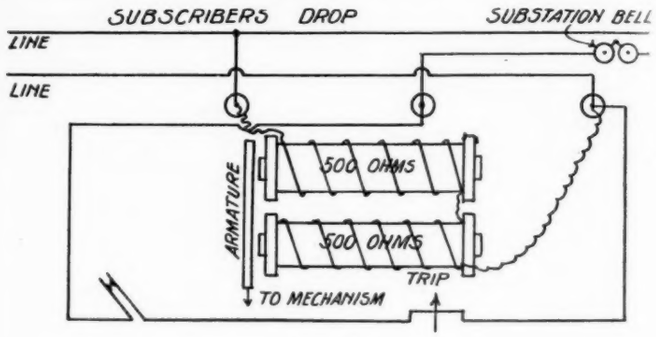


FIG. 6.

versed when the telephone is taken off the hook. In moving slowly down this plane the arm attached to the wheel passes over a series of contact points each of which, when connected up, sends a current pulsation along the line to central and the number of pulsations indicate at central the number of the calling station on a special drop, the operator on receiving such a call, in measured service, notes the number, rings out on the line and cuts in the subscriber. This makes a slow service and requiring as it does, complicated devices like all other known lock-out systems, is probably not likely to satisfactorily fill the demand. The act of hanging up the receiver restores the normal conditions. The design of the apparatus is ingenious and well worked out and with less complications would prove very useful. The selector can be used separately and has none of the drawbacks of the lock-out and indicator parts. There are two objections, common to all party lines, which have not yet been overcome: (1) Only one party can use it at a time; (2) one party desiring another party on same line has to hang up or take the receiver away from his ear while the other is being called. It

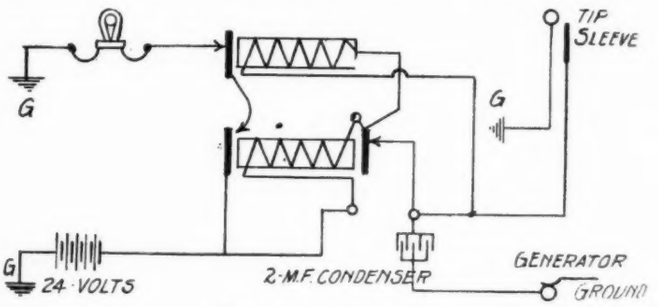


FIG. 7—TONE TEST.

is such objections as these which make the party line undesirable to-day. If these were overcome the apparatus would probably be complicated and would delay the service. An ideal system, therefore, is one in which only main lines are used. A party line not to exceed one on each side of the circuit, or a phantom party line in which selective signaling and talking is secured, is good, but not ideal.

Tone Test.—In all common battery exchanges there are always a number of permanents, on which the line lamp remains lighted for some length of time. This is due to

trouble and may be caused by a bad condenser, short circuit, or ground at the telephone; or due to carelessness on the part of the subscriber in leaving his receiver off the hook. Or it may be a short circuit or ground on the line, at the arrester or in the exchange proper. It is customary to have for such cases a break down position, or they may be cared for at the wire chief's desk when special arrangements have been made. In a large exchange, it is best to provide a "hospital" or break down position, for the reason that it simplifies conditions and usually the wire chief has enough to do without taking care of the lines on which his trouble men are working. It is obvious that these must be taken care of separately in order to put out the line lamp which would annoy the operator and heat the lamp. This lamp is put out by the "break down" operator plugging out the line by means of a special plug, the act of so doing under normal conditions would indicate to parties desiring that number "line busy," which would be a wrong statement and be liable to cause considerable complaint. To overcome this, a buzzer is introduced on the sleeve of the line out of order so that in addition to the click of the battery, necessary to hold up the cut off relay which indicates a busy line, the buzzing sound is heard and the operator knows the line is not busy but out of order, and so informs the calling party. When the sleeve is absolutely clear this is easily done, but when the cut off relay is permanently bridged to the sleeve this is not so easy and it is found the buzzer does not suit. In such a system, it is well to connect the exchange ringing circuit to the sleeve in addition to the battery, and the alterations are distinctly heard over and above the click of the battery. The ringing circuit is connected to the sleeve through a two microfarad condenser. Figure 7 shows the connections.

Branch Exchange Equipment.—The equipment of the branch exchanges should be uniform with the central office apparatus regardless of size or location. If within a reasonable distance of the main office, the power may be supplied from the main exchange, thus obtaining a better control and reducing the cost of maintenance. When the distance exceeds one mile it is a question whether it pays to furnish battery from the main office. Another reason why this is convenient is that direct current cannot always be obtained at these branches, and the engineer will have to be governed by local conditions in all cases where the branch is over a mile away. It has been common practice to furnish separate local and trunk cords, that is, one set of cords for local connections, and an individual cord for each trunk. This makes complication, is unnecessary, and usually the supervision of the connection is not good. By making the keyboard a duplicate of the main office the apparatus and working is greatly simplified and the supervision all that can be desired. In exchanges of over twenty lines it is customary to furnish the ringing power from central office. otherwise the hand generator must be used.

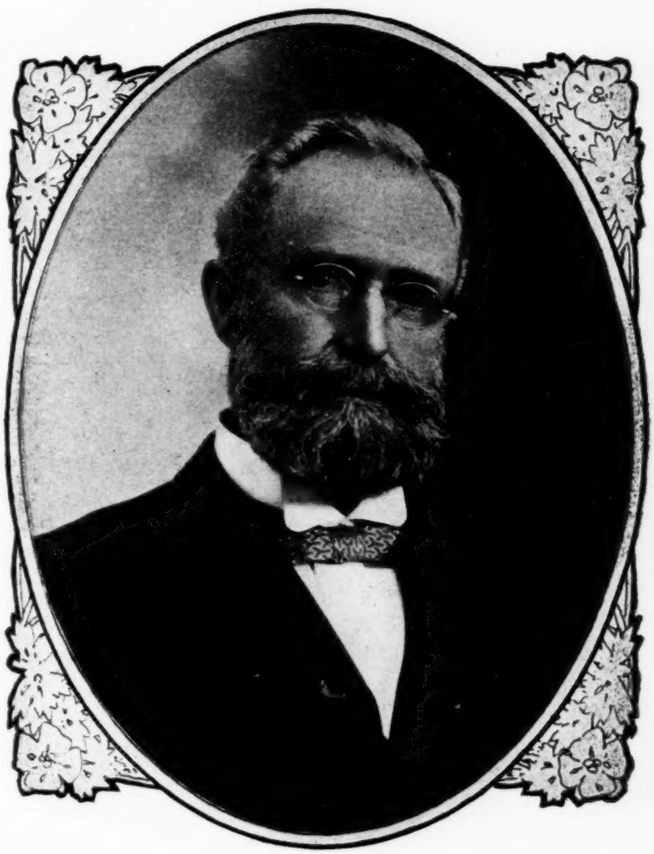
ALPINE TELEPHONES.

The telephone has robbed Alpine heights of some of their terrors. Two Swiss alpestrians lately lost their way on the great St. Bernard mountain. Wandering for hours in a fierce snowstorm, they at last reached one of the newly built shelters erected by the monks. There they found not only food and a lamp, but also a telephone connected with the hospice. They called up the monks, and soon one of the brothers appeared, accompanied by two St. Bernard dogs, and conducted the men to the hospice, where they received proper care. Many huts with telephones have been built in exposed places, and a number of lives have been saved in the winter. The familiar phrase, applied to the telephone, "it lengthens life," is thus literally justified.

Telephone communication has been established between Paris and Rome.

PROMINENT EXCHANGE MANAGERS

John W. Layne, the subject of this sketch, is sixty-six years of age and has been actively engaged in business for fifty years in Indiana, Illinois and Missouri. He entered the Independent telephone field at Carthage, Mo., four years ago, and with the characteristic energy manifested in all his undertakings he soon had a modern exchange with six hundred and fifty subscribers and a number of toll lines in service reaching all important points in the adjacent country.



JOHN W. LAYNE.

He purchased the two exchanges and toll systems belonging to the Webb City Telephone Company. He also purchased the Joplin Telephone Company's local exchange of eleven hundred subscribers. Mr. Layne merged his different companies under the name of the Mineral Belt Telephone Company, with a capitalization of $300,000, of which company Mr. Layne retained the presidency and general management until August, 1902, when the properties were sold to the Home Telephone Company of Joplin, with Theodore Gary of Macon, Mo., president and general manager and Mr. Layne vice-president, Mr. Layne practically retiring from active business after having built up a system of twenty-three hundred subscribers in a period of less than four years.

Mr. Layne has been successful in all his business ventures. He is a man of marked ability and has always enjoyed the confidence and respect of his friends and associates.

Financial Department

FEDERAL TELEPHONE EARNINGS.

The following are the earnings of the subsidiary companies of the Federal Telephone Company for the month of August. The net earnings of the United States Telephone Company are somewhat smaller than usual, owing to the extraordinary expenses incurred in getting the property in good shape. Next month will show much better than any other month preceding. The figures below show a total surplus of $13,107.74, with three companies showing a total deficit of $282, leaving a net surplus of $12,825,66 for the month. Following are the earnings:

CUYAHOGA TELEPHONE COMPANY.

Gross earnings		$32,276.67
Expenses and taxes		18,337.78
Net earnings		$13,938.89
Interest on bonds	$9,304.17	
Surplus	3,439.31	

COLUMBIA COUNTY TELEPHONE COMPANY.

Gross earnings		$ 4,270.07
Expenses and taxes		3,582.88
Net earnings		$ 687.19
Interest on bonds	$ 833.34	
Deficit	146.15	

FINDLAY HOME TELEPHONE COMPANY.

Gross earnings		$ 1,735.32
Expenses and taxes		967.15
Net earnings		$ 759.17
Interest on bonds	$ 366.55	
Surplus	387.62	

CITIZENS' TELEPHONE AND MESSENGER COMPANY, FOSTORIA.

Gross earnings		$ 1,040.74
Expenses and taxes		740.85
Net earnings		$ 299.89
Interest on bonds	$ 208.33	
Surplus	81.49	

LANCASTER TELEPHONE COMPANY.

Gross earnings		$ 1,331.99
Expenses and taxes		644.84
Net earnings		$ 687.15
Interest on bonds	$ 208.33	
Surplus	478.82	

LIMA TELEPHONE AND TELEGRAPH COMPANY.

Gross earnings		$ 2,530.87
Expenses and taxes		1,565.16
Net earnings		$ 965.71
Interest on bonds	$ 325.00	
Surplus	595.49	

MANSFIELD TELEPHONE COMPANY.

Gross earnings		$ 2,905.51
Expenses and taxes		1,788.02
Net earnings		$ 1,117.49
Interest on bonds	$1,039.81	
Surplus	10.18	

UNITED STATES TELEPHONE COMPANY.

Gross earnings		$32,164.73
Expenses and taxes		21,300.02
Net earnings		$10,864.76
Interest on bonds	$7,770.83	
Interest on preferred stock	562.00	
Interest bills payable	413.15	
Paid to secretary of state	125.00	8,870.98
Surplus for period		$ 1,993.78

MASSILLON TELEPHONE COMPANY.

Gross earnings		$ 1,695.11
Expenses and taxes		1,233.98
Net earnings		$ 461.13
Interest on bonds	$ 312.50	
Deficit	9.49	

STARK COUNTY TELEPHONE COMPANY.

Gross earnings		$ 4,412.07
Expenses and taxes		2,832.11
Net earnings		$ 1,579.96
Interest on bonds	$1,291.65	
Surplus	114.95	

WOOD COUNTY TELEPHONE COMPANY.

Gross earnings		$ 616.78
Expenses and taxes		465.17
Net earnings		$ 151.61
Interest on bonds	$ 273.55	
Deficit	$ 126.44	

YOUNGSTOWN TELEPHONE COMPANY.

Gross earnings		$ 4,006.57
Expenses and taxes		2,010.94
Net earnings		$ 1,995.63
Interest on bonds	$1,000.00	
Surplus	908.00	

ZANESVILLE TELEPHONE AND TELEGRAPH COMPANY.

Gross earnings		$ 2,335.73
Expenses and taxes		1,560.87
Net earnings		$ 774.86
Interest on bonds	$ 625.00	
Surplus	135.11	

COLUMBUS CITIZENS' TELEPHONE COMPANY.

Gross earnings		$15,414.79
Expenses and taxes		9,034.46
Net earnings		$ 6,380.33
Interest on bonds	$2,708.33	
Surplus	3,672.00	

FRANKLIN.

Gross earnings		$ 2,107.93
Expenses and taxes		816.83
Net earnings		$ 1,291.10

The Brooksville (Fla.) Telephone Company, which has been organized for about three months, has declared a

dividend of three per cent to the stockholders and nine per cent for improvements.

TELEPHONE COMPANIES.

Statements of the comparative service of Bell and Independent telephone companies are of considerable interest. A few years ago there were no Independnt companies, but they have multiplied rapidly and thriven well, until now there are about 6,000 in this country, says *Cent per Cent* for October.

In many important towns the Independent companies have more subscribers than the Bell, and in many cities, like St. Louis, Philadelphia, Pittsburg, Rochester, Syracuse, Buffalo, Indianapolis and Baltimore, they compete on practically even terms. New York, Boston, Cincinnati, New Orleans and San Francisco are the only large cities as yet without Independent exchanges.

It has been the almost universal experience when an Independent company was established in Bell territory that there were substantial causes leading to such establishment, and that, although the obstacles encountered to successful operation were innumerable, the Independent usually obtained solid lodgment finally.

Reports from seventy-nine towns in New York, Pennsylvania, Michigan, Indiana, Iowa, Ohio and Wisconsin seem to indicate that the Independent companies are too strongly entrenched to doubt the quality of permanency of their service, having over 63,000 subscribers to less than 33,000 Bell subscribers.

Both Bell and Independent interests are very large, the former having by far the strongest business organization and preponderance of wealth, but its many constituent companies are handicapped particularly in the matter of rate-making because of the many royalties they have to pay the parent company. On the other hand, Independent companies are fast learning the usefulness of association; they have attracted many shrewd business men into their operating; they own their equipment outright; they operate economically and enlist local business men as stockholders (an estimable plan), and many developments are looked forward to in this direction.

The cost of operation and maintenance is of equal moment to the two forces and represents the heaviest fixed charges, which, if largely reduced, would give either side an almost inconceivable pre-eminence over its competitors.

The Northville (Mich.) Telephone Company has declared a ten per cent dividend.

The South Bend (Ind.) Telephone Company has recently declared a semi-annual dividend of two and one-half per cent. The capital stock of the company is $200,000.

The directors of the Richmond (Ind.) Home Telephone Company have declared a quarterly dividend of one per cent. At the meeting A. C. Lindermuth was elected president, succeeding P. J. Freeman.

At a meeting of the directors of the Stromberg-Carlson Telephone Manufacturing Company, held at Rochester, N. Y., the regular quarterly dividend of one and three-quarters per cent on the preferred stock and two and one-half per cent on the common stock was declared payable October 1.

At a recent meeting of the directors of the United States Telephone Company a dividend of one and one-half per cent was declared upon the preferred stock, payable October 1. This is the first dividend to be declared upon this stock, and the officers say that the dividend will be promptly paid in the future quarterly. There is $110.000 of this stock outstanding. No action was taken with reference to declaring a dividend upon the preferred stock of the Cuyahoga Telephone Company, although the matter was considered. It is possible that the first dividend on the Cuyahoga preferred will be paid about the first of January.

The Interstate Telephone Company held its annual meeting in Dubuque, Iowa. A dividend of twelve per cent was declared and the capital stock, formerly $100,000, was increased to $150,000. The company intends to make improvements and extensions during the coming year and largely increase its facilities. The election of officers for the ensuing year resulted as follows: President, Vic Stevens, Dubuque; vice-president, R. W. Gadsden, Dyersville; secretary and treasurer, Charles Loxan, Earlville; directors, J. J. Kann, Elkader; J. H. Denkhoff, Dyersville; J. M. Dunn, Earlville.

The listing of the securities of the Maryland Telephone Company on the Baltimore stock exchange is expected in local financial circles. This company has $2,155,000 of general mortgage bonds. Of this amount $1,000,000 is reserved to retire the first mortgage bonds. The latter are the bonds which figure in the dealings on 'change. The capital stock of the company is $1,000,000. When the securities are issued the company will begin the issuance of periodical statements of earnings. It is understood that the company will make a good showing, as it is stated that, besides operating expenses, fixed charges and a liberal allowance for maintenance, it is earning a substantial surplus. When the Maryland company enlarged its resources to provide for extensions needed to take care of the growth of its business and for future requirements the financial connection with the plants in Pittsburg and other cities was severed, and the enterprise is now purely local. Long-distance connections are secured through traffic agreements. This plan has been found the most effective for developing the Independent telephone service.

TO USE TELEPHONE METER.

If present plans are carried out, with a year every residence telephone in Waterloo, Iowa, and every rural telephone on the Martin lines will be placed on a meter. The idea is to register the number of calls used by each patron and to protect the patron from a certain class of his friends who insist on coming into his home and making free use of the telephone. As a general thing subscribers are subjected to much annoyance by reason of people calling them up and asking them to step across the street to call Mr. A., who has no telephone, to come over and talk with them.

The object of putting the meters on the residence telephones is to limit the number of calls which may be made in the course of a year and to make an extra charge for all calls over this number. Mr. Martin has as yet not decided upon the number of calls to be allowed residence patrons, but it will be a large enough number to accommodate the average patron. Then when the non-subscriber comes in to use the patron's telephone he will have to pay for it, and the chances are he will not come so often. Mr. Martin says he has been besieged with patrons who ask him to keep their neighbors from bothering them for the use of the telephone. The patron, as a usual thing, does not want to ask his neighbors to desist from the use of the telephone and thus create a bad feeling between the two. He is perfectly willing, however, that the telephone company take some action which will result in stopping this annoyance. In order to limit the use of the telephone to the man who pays for it the Martin company has made a large purchase of meters for the use of residence and rural patrons. The meter system is an innovation in telephone circles, but is being largely adopted in the cities and in time will spread to the smaller places.

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The Economic Management of Modern Telephone Exchanges

CARL C. CURTIS, A. M. A. I. E. E.

COMPILATION OF THE TELEPHONE DIRECTORY.

Copy for the publication of the telephone directory is quite properly prepared under the supervision of the chief operator. It is, however, a class of work but imperfectly understood by the average manager, consequently a set of instructions and specifications for the publication and preparation of such work is appended. The copy can be most conveniently prepared from the chief operator's directory and by one of the office assitants. The copy should be written on sheets 8x13 inches in size. It should not be made up from an old directory by erasing and interlining. This plan affords bad copy and is slip-shod and inaccurate. The person making up the copy should adhere to the work continuously until it is finished and should be free from interruptions. The same person should, with another, read all proofs and revises, using the utmost care in correcting errors. All data and addresses should be sifted to the bottom for *facts* and nothing should be taken for granted.

GENERAL SPECIFICATIONS.

Stock.—The body of the directory should be printed on stock known as 25x38, sixty to eighty pound, S. & S. C. white book paper. The cover should be of not lighter weight than sixty-pound stock of some dark color. All the covers of the same issue should be of the same color, but in order to prevent confusion no consecutive issues should be alike.

Printing and Binding.—The body should be stitched and the covers pasted, unless the thickness of the body exceeds one-quarter inch. The directories should be trimmed to the uniform size of 9x6 inches, punched in the upper left-hand corner, and strung with a good stout twine, which when looped and knotted should be six inches long.

Composition.—The body of the directory, except headings, sub-headings, telephone numbers and index letters, should be set up in ten-point body type. Telephone numbers should be in ten-point black-faced Gothic; headings, fourteen-point Gothic; sub-headings, covering groups of names under one general name or classification, and lessees of private exchanges in twelve-point, with explanatory matter in six-point black-faced letter. Marginal index letters should be at least eighteen-point Gothic, with alphabetical division letters smaller.

An appropriate design should be devised for the cover and a plate made therefor; this secures uniformity and is somewhat cheaper in the long run, if directories are issued frequently. A neat, simple design is to be preferred to anything elaborate. The company name, shield and date are ample for the front cover, with the shield, chief operator's call and fire alarm number on the back.

General Arrangement of Page Composition.—The composition covers about 7½x5 inches, leaving five-eighths to three-fourths inch of margin all around. Names of departments under private branch exchange sub-headings are indented about three-sixteenths inch, and all other names arranged under sub-headings should be indented likewise, the telephone numbers being left in column with the other figures. Marginal index letters ought to begin at the top of the first page and step down toward the bottom to the back of the book to enable any one who may desire to cut away the page for thumb-indexing. Keep the names, classifications and addresses in separate columns and do not run them in together, as they do not stand out so clearly. Advertisements in a telephone directory are decidedly out of place and are in exceedingly bad taste. They obscure the text by attracting the eye away from it. An advertisement of the company's service may be placed on the inside covers or in a sheet in the back of the book with propriety, but it has no place on the margins or elsewhere.

Make-Up.—In the arrangement of matter the following order should be observed: Title page; page containing instructions to subscribers; main exchange directory; territorial exchange directories, if any; physicians' and surgeons' list; blank sheet for additional subscribers; change of position order blank, front and back (perforated); one or two pages of advertisement of local and long distance service.

Preparation of Copy.—In the preparation of directory copy the following rules should govern:

1.—Names shall be inserted in alphabetical sequence, which shall govern throughout the name.

2.—Where there are a number of telephones under the same surname, the alphabetical order of the initials or Christian names shall be followed.

3.—Names beginning with "Mc" head the list of M's, with "Mac" following, unless the number is sufficiently great to warrant the making of a separate list.

4.—The regular alphabetical classification holds good with names beginning with "O'."

5.—When two telephones appear under the same name, one of them being a business and the other a residence telephone, place the business telephone first.

6.—Sometimes it is difficult to tell how to properly divide a name. The rule is to list it under the most prominent portion or the one best known to the public; when in doubt, ask the subscriber for his preference.

7.—In Ohio and some other states the word "the" is prescribed by law as a part of the name of any corporation organized under the laws of that state, therefore in listing such corporations the word "the" will generally be the last word of the name. When in doubt as to whether the word "the" is essential to a corporate name, call the subscriber.

8.—In alphabetical arrangements the sign "&" is to be ignored. The same rule applies to letters not appearing in the Christian name as it is to be printed.

9.—In cases like "J. B. Farwell & Co." list thus, "Farwell & Co., J. B." Also similarly list "Fred Miller Brewing Co." as "Miller Brewing Co., Fred."

10.—List hotels under the firm name only, unless it be a prominent hotel, without the hotel name forming any part of the firm or company name. Hotel pay-stations are to be listed under the name of the hotel. This same rule applies also to restaurants and saloons.

11.—Express, railroad, telegraph, government, county, city, in short all public telephones are listed twice if they are susceptible of a double listing and public convenience seems to require. These telephones are listed under a classification sub-heading (12 point type) like "Express Companies," "Telegraph Companies," "United States Government Offices," "Erie County Offices," and "City Offices." They are also listed under the name of the company or office, as Adams Express Co. and "Treasurer, Erie County," etc. In most cities of any size the railroads will usually have three or more telephones, in which event the name of the railroad will appear in heavy faced sub-heading, and where there are two or more railroads under the classified listing the word "Railroads" should appear in bold face type.

12.—Many public officials, like city attorneys, having no offices in the city hall, lease and pay for their own telephones—*e. g.*, E. B. Powell, city attorney, has no office in the city hall, and pays for his own telephone. Under "City Offices" he would appear under the title of his office as city attorney (omitting the word city in listing as superfluous), and also under the "P's" as "Powell, E. B., city attorney." Avoid any unnecessary listing of public offices.

13.—Except as above noted no telephones are to be listed twice without an extra listing order signed by the manager. A charge of five dollars per annum for each extra name is to be made in all cases for such accommodation. The telephone company will be listed once under its corporate name with the department telephones arranged in alphabetical order and after those, but under the explanatory caption, "booths and public pay-stations," shall appear the local pay-stations of the company. Company telephones are not listed under the name of the office elsewhere, but the residence telephones

of its officials, although they may be for the convenience of the company, are listed under the individual's name without title.

14.—Residence telephones should be distinctly specified as such, ignoring the business of the party in the classification column entirely, except in the case of physicians and dentists, *e. g.*, "Davis, Dr. Carrie Chase, Physician (Res) 225 Jackson." If this rule were not adhered to many persons residing in the same building where they transact their business would be encouraged to take residence rates and use the telephones for business purposes.

15.—Where one subscriber leases three or more telephones and they all appear under the same name, with a difference only in classification, the name shall be set up in sub-heading type (12 point) and the telephones listed below it by classification being indented from the name column line three-sixteenths inch. Extension telephones are not entitled to listing unless they are leased as party lines with selective signals.

16.—Relief and one-way service lines to the same location are not listed, nor should more than one telephone number be shown, although the subscriber may have a dozen or more lines to his place of business to handle his traffic. If, when adding lines for relief purposes, adjacent multiples near the old numbers are not to be had, it is necessary to assign another consecutive group of numbers, using the lowest number of the series for the call number.

17.—Subscribers located on the ground floors of large blocks and having street entrances are to be given the street and number address instead of the name of the block. Subscribers located elsewhere in blocks are to be given as addresses the name of the block in preferance to the street and number.

18.—In compilation of directory copy, skip a line between every name to allow of inserts afterwards if necessary.

RULES FOR THE OPERATING ROOM—THE CHIEF OPERATOR.

1. The chief operator is responsible for the proper handling of the exchange as well as the quality and efficiency of the service. She will report to and receive her instructions from the manager.

2. She is responsible for the conduct and discipline of the operating force and for the care and condition of the exchange and its apparatus.

3. It is her duty to watch the load of business and to economically distribute her operators, providing at all times a sufficient number thereof to handle the same without delay.

4. She is responsible for the proper handling of all messages passing through the office, and must promptly investigate any report of failure to talk with ease on any circuit and make report of same with cause.

5. The chief operator is authorized to employ or discharge any and all persons connected with her department.

NIGHT, ASSISTANT, AND ACTING CHIEFS.

6. The night, assistant, and acting chiefs will report to and receive their instructions from the chief operator.

7. They are, while on duty, responsible for the conduct and discipline of the entire operating department, the care and condition of the operating room and apparatus.

8. They are empowered, and it shall be their duty, to suspend, without pay, any employe of their department for any violation of the rules thereof which may come to their notice.

9. They are required to distribute the operators in the most effective and economical manner for handling the load and to report any shortage and dismiss any surplus in the force.

NIGHT CHIEFS.

10. The night chief will prevent any waste or unnecessary use of lights, either gas or electric, and it shall be her duty to watch and if possible protect the property of the company against fire.

11. It is her duty to summon to her aid in emergencies the city fire or police departments, or at any time when she may deem necessary to protect the interests or property of the company, the entire inspection and trouble force of the exchange, calling first the wire chief or city foreman, or both.

12. She will each night make a careful test of every cord in use on both the local and toll board, placing a ring on every cord showing any indication of trouble.

13. After 10 o'clock p. m. the offices and exchange are closed to all but employes of the company, and they are to be admitted only when the nature of their duties requires their presence. It is, therefore, the duty of the night chief to at that hour lock securely all doors and to extinguish all unnecessary lights.

ENFORCEMENT OF RULES.

14. Remember that when placed in authority you are to *fill* the position, and are to exact from those under you the respect due the office you hold. Authority, even though but temporary, is given you to be used and neglect to do so is neglect of duty.

15. Do not forget that the fundamental object of a telephone exchange is to give service, and that every effort should be made to complete every proper connection asked for, subject to the rules and regulations governing the service.

16. Where the wording of any rule or special order is explicit and arbitrary, and whether it refers to the public or employes, you will enforce it to the letter.

17. In the case of the rules governing trunk line service and pay-stations, you are expected to abide by the spirit rather than the strict letter of the rule, and to use your best judgment as to the extent of the enforcement which will best serve the interests of the company. Hereafter all rules and orders wherein the enforcement is optional with the chief will have the word "discretionary" appended.

RECEPTION OF COMPLAINTS.

18. You will receive all complaints in a pleasant, business-like manner. Assure the subscriber that his complaint will be duly reported and investigated, and, in the case of trouble, cleared as soon as possible. Avoid the least suggestion of impatience in your voice. A few quick-spoken questions as to the nature of the trouble will do much toward preventing the party from gathering the impression that the person at the desk is there in an ornamental capacity only. A subscriber should never be allowed to leave the telephone in a dissatisfied frame of mind if it is within your power to mollify him. Gentle tact and persuasion will succeed where argument fails.

19. Carefully report all trouble and complaints entered by subscribers and others, no matter how trivial. Promptly investigate all complaints showing evidence of being due to traffic.

20. Enter the switchboard trouble on switchboard trouble slips; all other trouble and complaints on the complaint report. Report the complaint in full. If you are aware of the cause thereof say so.

21. Report any subscriber using profanity to the operators.

22. Sign the complaint report each time you surrender the desk for all complaints you have taken See that your predecessor does the same.

CHECKING TROUBLE REPORTS.

23. The complaint report will be returned to the chief operator by the wire chief, together with the corresponding trouble report and the inspection slips, each morning.

24. Check each case of actual trouble shown on the complaint report by the inspection slips, using a red pencil. Check off no case not shown "O K" on the slip. The report is not to be returned to the office until every case thereon is cleared.

25. If trouble recurs on a line previously reported, clear by an unfiled inspection slip, and unless it is evident that the second case is due to a cause different from the first you will endorse the word "reopened" in red ink across the face of the slip and return it at once to the wire chief. When the case has been cleared the first slip will be returned with the second, the report checked and both slips filed together.

GENERAL INSTRUCTIONS.

26. When at the desk you will respond to all calls with the words "chief operator."

27. Calls for any line while it is out of order are to be given to the subscriber as soon as it is repaired.

28. Always write your name on the back of any order given you for a new line, change, removal, or extra equipment. If the order is given by a third person for the would-be subscriber, so state.

29. Put contract number on all orders other than new line.

30. Quote rates from the rate sheet appended, and let the party distinctly understand that the order is given subject to acceptance by the manager. Do not under any circumstances install extra equipment free of charge. Extension bells should be either rented or sold outright, but positively refuse to sell telephones. If a person orders an extension bell, state on the order whether he desires to purchase or rent the same.

31. The windows of the operating room are *never* under any circumstances to be permitted to be open in damp weather. Moisture rusts the signals and prevents their working properly. You will be obliged at times to sacrifice the comfort of the operators to protect the apparatus.

32. Never tell a subscriber that a party he has called for "Had his telephone taken out"; say instead, "They have no telephone" or "*We* removed that telephone."

THE OPERATORS.—ATTENDANCE.

33. Punctual attendance is required. In case it becomes necessary to be absent a report must be made to the chief operator before the time assigned for duty. Operators coming in late will report to the chief. Continued tardiness will not be tolerated.

RELIEF.

34. Operators will remain in their positions at noon and night until relieved. The bell will tap twice as a signal and you will stand facing your board until the signal (one tap) is given for the relief to take your place.

35. Relief operators will at all times enter the room in a quiet, orderly manner and in order of their positions at the board. They will stand behind and a little to the left of the operators they are to relieve, until the bell strikes once, when they will take their places. No talking will be permitted.

36. Relief operators must be ready to go on duty the moment the bell sounds. They will form in line in the cloak room at the first bell and will be prepared to march at the second stroke. They are under no circumstances to enter the operating room previous to this signal without special permission from the chief.

37. The retiring operators, when their places have been taken by

the relief, will stand on the mat facing the office and await the signal to retire—one bell.

38. The trunking operator will not be allowed to leave her position for any reason unless relieved.

GENERAL BEHAVIOR.

39. You are required to be polite to the subscribers under all circumstances.

40. All conversation between operators is forbidden except for trunking connections. Between the hours of 8:30 p. m. and 6:30 a. m. and on Sundays the strict enforcement of this rule is optional with the chief in charge.

41. You will always use the order wire to order up trunk connections, and are under no circumstances to call across the board.

42. Operators are strictly forbidden to talk over the lines with subscribers or anyone else about any other than exchange business. You are not to use the lines for personal messages at *any time* when on duty.

By "exchange business" is meant the regular prescribed phrases necessary for ascertaining the wants of subscribers and the completion of connections. The rules require the reference of all other matters to the chief operator. If you require information regarding a connection you will obtain it from the desk, not from the operator next to you, and it is your duty to promptly report to the chief all trouble and defects in either circuits or appartus which may come to your notice. You are to hold no conversation and to answer no questions addressed to you by persons present in the operating room, whether they be employes of this company regularly assigned for duty therein or others, without the express permission of the chief operator.

43. Connect promptly with the desk all subscribers wishing to make complaints of the service and also any person using profane, improper, or abusive language.

44. Refer all inquiries regarding long-distance connections direct to the toll board. You will not attempt to answer them yourself, even though you may be able to supply the information. Refer requests for other information to the desk.

45. Operators are not permitted to chew gum or eat anything in the operating room.

46. Speak in a clear, low tone of voice close to the transmitter. Cultivate a quick, concise, business-like voice; strictly avoid drawling your words. Loud talking is forbidden.

47. You are not permitted to listen on a connection longer than necessary to get the parties talking. You are positively forbidden, under any circumstances, to mention either inside or outside of the office anything that may come to your notice while at the switchboard. Nothing will insure summary dismissal more certainly than the repetition of anything heard over the wires, outside the office. In addition to this it is a penal offense according to law, punishable by fine and imprisonment.

48. Operators will maintain an erect position facing their respective boards and attend strictly to their own business.

ANSWERING CALLS.

49. The operator answering the call will be held responsible for the connection, and is required not only to answer the subscriber promptly, but to see that the party called for quickly responds.

50. In answering calls always use the one word "number" with the *rising* inflection. You will repeat back the number given you, calling the figures separately. For example, if you are asked for "four fifty-six," repeat, "four, five, six," using the *falling* inflection unless you are in doubt.

51. You are not to use the words "well" and "hello."

52. Give a reasonable ring for about one second. After ringing three times and the party fails to answer, you will say to the subscriber, "They do not answer." You will then report the call to the desk for record.

53. Operators will never tell a subscriber that the party he has called for "had his telephone taken out." Subscribers calling for numbers plugged with red or black plugs are to be told "that number is not in use." For further information connect them with the desk.

54. You will not mention the opposition telephone in any way to a subscriber if avoidable.

55. Do not say that a line called for is "out of order." Simply say, "they do not answer." If he wants further information connect him with the desk.

56. When a line tests busy you will tell the party that, "the line is busy."

57. When it does not interfere with your duties, it is a good plan to call back a subscriber who has encountered a busy line and tell him he can have them. Never fail to do this when requested to do so, and always remember that little courtesies of this kind are appreciated.

58. You will not, under any circumstances, connect a subscriber with a number when he fails to designate just what number is wanted; for instance, if you are asked for an express company, a lawyer, a doctor, or a laundry, it is your duty to get the number and failing to get it refer the subscriber to the desk.

59. You will make no connections by name. If a person calls for Mr. Jones, or Mr. Smith, say to him, "what is the number, please?" If he does not know, say to him in a pleasant tone of voice, "I will give you No. 125, they can tell you." You will not tell a subscriber to, "look in your book for the number," nor will you further discuss or argue the question with him, but connect him with the desk as soon as possible.

60. Fire, police and ambulance calls, and calls for executive officers of the company, when asked for, are to be given at once, whether by name or by number. Otherwise there are no exceptions to rule No. 59.

61. When you have a connection up and one of the parties signals a recall, you will immediately cut in, saying, "central," avoiding the slightest suggestion of petulance or impatience in your tone.

62. Answer all calls promptly and be as prompt in disconnecting. The one rule is as important as the other.

63. You are expected to help out your neighbor at all times; that is, to answer calls on the next section when more than one signal shows at a time, or when the other operator is busy; in other words, do as you would be done by.

64. Beware of turning your head at the switchboard when any one enters the room. The place for your gaze is upon the signals at all times.

CARE OF APPARATUS.

65. You are to exercise the greatest care in handling the plugs. When breaking connections do not drop them, but return them to their seats the entire distance by hand.

66. Do not press upon the heel of the plug after inserting it into the jack; grasp the body of the plug with the thumb and forefingers to send it home. Do not pull out the plugs by the cords.

67. Do not allow the ringing key to fly back to the neutral position. Keep your fingers on it and restore it quietly. Avoid turning or twisting the rubber handles on the keys.

68. Never touch the signals and do not play around the jacks with the plugs.

69. If for any reason you are required to have a lead pencil at the board, you are not to mark the switchboard with it in any way. Be careful of the cabinet work and do not scratch or mar its surface.

70. You are not to take the transmitter in your hands if a person fails to hear you well.

71. The company has provided each operator with a receiver for her exclusive use. The cost thereof, three dollars, is charged against her and for its proper care and condition she will be held accountable. If for any reason a receiver fails to work it must be reported to the chief who will replace it with another pending repairs. Operators are to keep their receivers in their lockers, and they are to be loaned only with the express permission of the chief

THE RECREATION ROOM.

72. The recreation and locker rooms are for the exclusive use of the lady employes of the company.

73. Parcels or packages are not to be delivered to, or taken into the operating room, by or for any operator. They can be cared for at the office if desired. Wraps, wearing apparel, and pocket books are to be left in the lockers, and are not to be strewed around in as to the general public.

VISITORS.

74. Visitors will be admitted to the operating room only when their admittance is authorized by a written pass signed by the manager, or by verbal orders to the chief in charge. This applies to the friends of employes, to employes not actually on duty, as well any of the rooms.

DUTY OF CHIEFS.

75. The chief operator is charged with the enforcement of these rules and is responsible for the entire traffic department, all of whose employes are answerable directly to her, and she is authorized to employ or discharge for cause, any and all persons under her jurisdiction. Her decision in all matters pertaining thereto shall govern, subject to review by the manager only.

76. The night and assistant chiefs, or any operator acting as chief, and placed in charge of the operating room in the absence of the chief operator, will be held strictly accountable for the service given hereunder. She is empowered and it shall be her duty to suspend any operator detected in disobeying these rules or any order given and published hereafter.

77. The penalty for violations of these rules shall be suspension without pay, or dismissal.

LONG DISTANCE—GENERAL CONDUCT.

78. Operators must be courteous in all their dealings with subscribers and with each other, but must hold no conversation beyond that necessary for receiving calls and making connections. For any difficulty in service, the subscriber must be connected with the chief operator.

79. Operators must speak in clear tones, directly into the transmitter. The receiver must be retained at the ear continuously while the operator is at the switchboard.

80. Operators are forbidden to use the lines for personal or

other communications that are not in the nature of company business.

ANSWERING CALLS.

81. Line operators upon receiving a call from a distant point must answer by giving the name of their own office.

82. Upon receipt of a call from a customer the operator must at once answer, "long distance."

83. When asking a switching station for another point say, "Columbus wants Cleveland." When Cleveland responds say, "Cleveland, get M 1877 for 486 Sandusky." If the message is to be reversed say to her, "Reverse charges." If the other station states that party must be sent for say, "Send for party and advise amount of messenger fee."

84. Frame your requests in the most concise language possible. Avoid the retention of a line for one moment longer than necessary to accurately transact business.

HANDLING MESSAGES.

85. Get from the customer full information as to the point and person wanted, making out at once a ticket covering the same. Notify him if there is liable to be any unavoidable delay in completing his call and tell him that he will be called. After the point called for has been obtained, pass full details of the call to the operator at that point, and when communication with the desired person is secured, and before the connection is put up the operator will say to the customer, "We have your party; the rate is..... cents for ..... minutes, go ahead." She will then see that the conversation is properly started, from which the charge will begin.

86. The operator must watch the connection carefully for any interruption to the service, by cutting in on the line at intervals.

87. Make every effort to get your message through successfully, and co-operate in every way to complete incoming calls as well.

LISTENING IN.

88. When the conversation has apparently ceased, the operator will listen in for five seconds and ask, "Are you waiting?" If there is no answer take down the connection and indorse on the ticket the time consumed by the conversatoin by cutting in and speaking. *Always wait and listen before speaking.*

89. Operators at intermediate offices, on a through connection, must listen carefully before plugging in, and allow ten seconds to elapse before using the circuit. If after listening for ten seconds, she finds the circuit in use she shall, *without speaking immediately cut out.*

90. Operators must watch the circuits under their charge and assure themselves that conversations are carried on without difficulty. It is the duty of the operator to report to the chief operator any failure of circuits to give good commercial service. Where conversations are interrupted the operator will make due allowance therefor, noting on the back of the ticket the nature and duration of same.

91. When trouble appears on a circuit in use, the connection must be at once transferred to the best circuit available.

92. Report any trouble or seemingly unwarranted delay in making up connections, either through faulty circuits or operators at other points, to the chief toll operator, giving complete data as to time, circuits used and routes. Attach this report to the ticket.

CALLS FOR NO PARTICULAR PARTY.

93. When call is made for a particular person, the customer is not to be connected with the line until the person wanted is at the distant telephone. If call is made for a telephone number, or firm or company name, the operator will ask, "Any particular person?" If the person called for is out, simply say he is out, and connect the customer with the office should he so desire, for which service the regular charge must be made.

LOST CALLS.

94. If for any reason a call cannot be completed at the time of calling, the operator must notify the customer, ascertaining at the time if further effort is desired. If so, the ticket is to be held and the call put through as quickly as possible. If the reverse, the ticket will be indorsed, "lost," giving the reason.

95. The regular tariff rate is to be charged for the first three minutes or fraction thereof. If at the expiration of that time the line is still in use, the operator handling the connection will cut in and announce distinctly, "three minutes," and listen for the conversation to cease. If it continues beyond thirty seconds, charge for one minute. At the expiration of each three-minute period the operator must announce distinctly, "six minutes," "nine minutes," as the case may be. If the conversation continues beyond thirty seconds, charge shall be made accordingly. This formality may be dispensed with at the *especial request* of the customer, but not otherwise.

96. When a line has been held for overtime you will always call back the subscriber and inform him of the amount. This is to be done in every case, except where the subscriber requests that it be not done.

REVERSED CHARGES.

97. Connections *must* be charged to one of the two points between which the conversation is held, and not to a third party or number.

98. If the application is made to reverse the charge for service, the operator at the originating end, before completing the connection must ascertain from the distant end if such charge is acceptable, and if so, the originating operator must mark the ticket, "reversed," and indorse thereon the name of the person calling. Reversed messages must be supervised by the originating operator.

99. You will not reverse charges on any message, without first obtaining the consent of the party who is to pay for it, neither will you accept reversed charges payable at this end on persons not of approved credit.

TICKETS.

100. A ticket shall be made for each and every message passing through the office.

101. Make out your tickets carefully and above all accurately. Omit nothing and put down the time finished as well as the time connected, whether there is overtime or not. Take nothing for granted.

102. Toll bills are not to be charged to non-subscribers nor to any but the subscriber from whose telephone the call originates.

COMPLIMENTARY MESSAGES.

103. No messages, either sent or received to or from the office on other than *bona fide* telephone business are to be checked as "complimentary." Messages between exchange officers and other parties are to be checked as paid unless they are on telephone business, and the sending operator so informed.

104. No officer, agent or employe of this company shall be permitted to exercise the dead-head privilege except in strict accordance with the above.

PAY STATIONS.

105. Anyone calling from a public booth, whether a subscriber or not, shall be required to pay even for local calls.

106. On pay station calls at the expiration of the three-minute period cut in and inform the party. If he wishes to continue the conversation require a fresh deposit sufficient to cover any additional period he may indicate. Messenger fees must be deposited before the message is passed.

DIFFERENCE IN TIME—NIGHT AND DAY RATES.

107. The difference in time between points on the lines connecting with the company has necessitated the following rules concerning the night rate: The time prevailing at the originating point shall govern the rate; in the case of reversed messages the time at the originating end shall control.

108. A call originating under the day rate and continuing under the night rate must be treated as follows: Make one ticket at the day rate for the first three-minute period and such additional time as may be consumed before 6:00 p. m., and one ticket at the night rate for all time consumed thereafter. The first three minutes shall in all cases be checked at the rate under which it originates. For example, a call originating at 5:55 p. m. and continuing till 6:06 p. m. must be charged at five minutes day rate and six minutes night rate. A call originating at 5:59 p. m. and completed at 6:02 p. m. would be charged the day rate alone. The same rule governs the change from night to day rate.

TESTS.

109. The following daily tests must be made at 7:30 a. m. by chief long-distance operators:

(a) Trunk tests, for defective trunks.

(b) Wire tests, for defective lines.

(c) Pay station test, for defective instruments and lines. Defective apparatus or lines disclosed by the above must be immediately reported to the chief operator.

ELIGIBILITY TO SERVE AS LONG-DISTANCE OPERATORS.

110. No operator shall be eligible for the position of long-distance operator, until she is thoroughly familiar with these rules and with the rules and regulations of the long-distance telephone company governing long-distance traffic.

111. Operators assigned for duty at the toll board will report for duty to the chief toll operator.

RESPONSIBILITY OF LONG-DISTANCE OPERATORS.

112. Toll operators will be held personally responsible for each and every message the toll for which is lost through their failure to observe the spirit of the instructions governing local and long-distance service. Messages so lost will be charged directly to the operator at fault and the amount thereof deducted from her salary.

These rules have been gathered from various sources: some adopted in whole, some in part, while others have been framed by the author from time to time, to meet various contingencies as they arose. The lapse of time and repeated revision have obscured the identity, and prevent the scant courtesy of proper acknowledgment of authorship to those to whom it is due.

QUESTIONS AND ANSWERS ?!?!

CONDUCTED BY J.C.KELSEY, PROFESSOR OF TELEPHONY, PURDUE UNIVERSITY

You will please find enclosed a rough sketch, with explanation, of our rural telephone system. We wish you would suggest a method for overcoming cross talk if such a thing is possible. Would there be any benefits derived from connecting all the instruments to one wire and grounding it at the exchange rather than each instrument separately?—B. V.

Your longest line is the trunk line, the distance you have not given. The only solution will be to run a common wire of sufficient size, a No. 10 iron, or No. 12 copper would be much better, from one exchange to the other, that is, the offices at the end of the trunk, and attach every subscriber's instrument to this common wire, rather than the earth. You have suggested your own remedy. Cross talk that you meet comes from earth currents, reinforced by the induced currents between the wires. Some of your longest lines need not be on the return, that is, if they diverge after leaving the exchange. But being on the same pole line, the paralleling, combined with a common earth return, it is no wonder that cross talk is bad. The return wire must be well put up, and if the ground is to be put on it, or any leak of any dimension, it must be right at the central office. The whole idea is to shorten the common earth connections, and if your common return ended even a half mile from the office, it would give better results than if the earth was left to act as entire return. In fairly large exchanges, it is not even necessary to run the return back to the office. It can be left open, thereby causing a return over all the other lines. It looks reasonable that better service would result if the return came clear back to the connection terminal at the exchange. In the absence of a sketch, the explanation of the above conditions is that this system had eight grounded lines, all on the same pole line, ranging from two to ten miles in length. The need of a return is apparent.

Replying to your answer given in October TELEPHONY to the B. C. Telephone company regarding line that was noisy when in connection with a certain line and free from noise when connected with the others, in which you laid the blame on the possible fact that the short line was unbalanced by a bad connection, or something which only showed up on those lines disturbed by great street railway induction, etc., we made a test as was suggested. We disconnected one side of the eight-mile line at the cable pole, and connected it with the Cincinnati line and we get the same noise. We connected up the side we had disconnected and then disconnected the other side of the short line, getting same noisy results. Generally when lines are connected and the calling and called-for parties are with receivers off the hook the lines become quiet. Both lines are new, built within the last four months, and the joints were all flushed with half and half solder, being very particular with the joints. We write to put you in full possession of the facts.—B. C. Tel. Co.

Such a test was not suggested. The test was to cut away the short line, while in connection with the long line, say every mile, and noting the effect with a receiver. Supposing that the line was opened at one mile distance, both sides. The line was quiet. Then the noise was farther on. Then go one to two miles, then to three, and so on till you find a place that the line is noisy in spite of the part cut off. It is here that the trouble lies. The fact that you cut open just one side of the line was no test, for the reason that a line open on one side is the worst unbalanced line there is. You have infinite resistance on one side of your line, while on the closed side, you have a finite resistance, that of the wires. The very cause of the trouble is an unbalance, that is, more resistance on one side of the line than the other, yet in your test, you put in an infinite resistance on one side. The line should have been more noisy than on the worst normal connection. When testing a metallic line, always open both sides of the line. I am satisfied that the unbalance of the short line is there, and can only be found by accurate electrical measurement, or by connecting said line with the long line, and go from point to point, cutting off both lines of the line ahead of you until you come to a noisy place. The trouble is somewhere between the noisy place, and the quiet place. If on connection, however, and the short line is opened on both sides at the cable box, and noise due to connection is still present, it is useless to go out on the line, for the trouble is between the cord circuit of connection, and the open place at the cable pole. I am not certain that you do not use a series drop. There are thousands of lines that can be connected together nicely, with a series drop in the cord circuit, but when one of these lines gets paralleled by a trolley, it is all off. In the case at hand, the cord connection has been proved all right, because other lines have quiet connection with the long disturbed Cincinnati line. I have had to run down such cases, and feel certain that the eight-mile line is to blame by reason of being unbalanced somewhere. The readers of TELEPHONY would be glad to know the final results of your trouble location.

I have constant trouble with my generator on the switchboard. I have two generators on hand, and keep one on the road for repairs at all times. Where can I get a generator that will stand? We have several long lines, bridging lines, and use a 100,000 ohm generator.—D. P.

You have not told the amount of the load that you have on the lines. If your lines are bridged, then it is the feature of your generator to deliver current, and not a pressure. The expression, 100,000 ohm generator, is a misnomer. It means that the generator will ring a sensitive bell through 100,000 ohms, but that does not signify how much the current output. The generator for your work need not be particular about ringing through 100,000 ohms, because that is not the condition that it meets. The average bell ringer is 1,600 ohms. If you bridge another bell on the line, then your generator has to furnish current along a path of 800 ohms. The next bell pulls it down to 566 ohms, so your resistance, instead of mounting up to that imaginary 100,000 ohms, is getting down to stern measurable resistances. It takes current, and not a high pressure. So when you order a generator, buy one that will furnish current for twenty or forty bells in bridge, and disregard the 100,000 feature. No doubt, you can find such a generator in the market.

Kindly inform me of the apparatus required to test and locate faults on toll lines. Also best method of testing insulation resistance when there is a great deal of static on the line. Is it necessary to keep record of capacity of line, and what is a simple method of determining the same? Explain to me in detail the methods of testing and locating breaks, one side dead open, both sides open, shorts, crosses with other lines, and cross with local line that has battery on it. I noticed in one place in TELEPHONY that the frequency of the currents of the voice were 400 per second, under head of Properties of Wire, and in the queries you give a frequency of 3,000 per second. Kindly give the range of the frequencies of the voice. From your description of the condenser in last month's issue I have formulated the following principle: "With a given

voltage and a given capacity the amount of current that will pass through a condenser varies directly as the frequency." If so, does current increase or decrease with an increase in frequency, and with a given capacity and a given frequency does the current passing through a condenser vary directly as the voltage? The answers to questions regarding the condenser and the repeating coil are the only clear definitions that I have ever seen. These two simple pieces of apparatus are seemingly very little understood by the everyday electrical engineer when it comes to explaining their action with regard to the voice current.—J. G. L.

The ordinary method of testing on toll lines, locating ordinary faults like crosses is to use the Wheatstone bridge, galvanometer, and battery. This combination is used extensively, and is manufactured by several companies. The original measurements should be made when the line is new, so that any resistance measurement could be readily interpreted. Supposing that the original line measured 100 ohms at the first station. A reading of 50 ohms would signify at once of a cross half way to the first station. Then a ground measurement of each side of the line should be taken, so that when a line touches ground, an approximate idea could be given to the lineman, as to its whereabouts. There is no need of keeping a record of line capacity. To determine line capacity, a standard condenser is required, a galvanometer and battery. First charge the standard condenser, and by suitable switches, discharge it into the galvanometer, and note the deflection. Then charge the cable in question, or capacity to be measured, and then discharge it into the galvanometer, also noting the discharge. You will have a comparative result given.

To test for an open circuit in a cable, Mr. H. W. Fisher has described the following method. To find the end of the broken wire, the capacity of the wire to the open place is compared to the capacity of a wire in good condition, and running the whole length of the cable. If the insulation resistance is high, and the break is so complete that no current passes at the point of rupture, the position of the fault may be found accurately. If the cable is moist, and the insulation resistance thereby low, there is no certainty of the method. First measure insulation resistance of the broken wire, and also of the good wire. If not over twenty mego-ohms, then results can be ordinarily accurate. If near one mego-ohm, there is no accuracy.

To test high insulation, put a battery and receiver in series, and connect with sheath and wire to be tested. Charging current will flow into the cable, and give a click to the receiver. Remove the receiver, and in an interval of time, repeat the performance. If the cable is all right, that is, high insulation resistance, no click will be heard, as the high resistance has retained the original charge. If cable wire was faulty, the charge would dissipate, and the receiver would click on every application. One volt battery, in a cable of 1,900 feet, or a few miles, and no click on later applications, will indicate 50 mego-ohms.

In underground cables, apply an alternating current to the affected circuit, and then carry an immense exploring coil with a receiver in circuit along the street directly over the cable at fault. The alternating current will induce a current in the exploring coil even though a few feet away, which sounds a note in the receiver. This means that the two wires are still closed, and are carrying current. As soon as a point is reached where the note of the receiver disappears, it shows that the coil has been carried by the affected spot, so that very accurate results may be obtained.

As to the frequency of voice currents, it ranges from 16 to 5,000 cycles. That is the limit of the receiver's action, when it cannot detect the note coming from a higher frequency. The ear can detect 20,000. The average talking frequency, supposing that arrangements were being made to use distributed self-induction to obviate effect of capacity, the average frequency to account for will be 1,500, and possibly 1,800. The use of 3,000 cycles is made to account for the higher tones.

The current passing through a condenser does vary as the frequency. If the frequency is nothing, or a continuous current, practical experience will tell us that no current flows. The higher the frequency the more will current flow, when voltage remains constant. To such high frequencies as the voice currents, the condenser will act like a dead short, or closed circuit. One cannot detect its presence, or its absence. But when one sends the ringing current of the lowly twenty cycles, he is aware of it. If he will short circuit the condenser and note the effect upon the bell, the result will be plain. Were it not for the condenser acting this way, the common battery telephone systems would be in a hard way.

When cutting over series bells, of low resistance, to common battery operation, much difficulty is experienced on account of the poor ringing of the bells, with the condenser in the circuit. Then an addition of another condenser will make the bell ring good, and what better proof is wanted. The subject of frequency is truly a broad one, and so many appliances are there to the telephone that all electrical engineers have plenty to study.

I find that by making and breaking the circuit with six volts and the primary of an induction coil that the secondary circuit will generate a spark nearly one-eighth of an inch long. Is there not something unusual about this? I found also that it gave me a strong shock when I touched the secondary wires.—E. M. C.

Here you have the real induction coil effect, noticed in the medical batteries, etc. The make of the circuit did not give you a shock, nor did it cause a spark to jump over a space of one-eighth of an inch. It was the break that gave you the effect. Then it is a self-inductive effect. In making the circuit, the current takes a little time to come to the six volts' value. It therefore could be said to spread out the shocking possibilities, so that it could not be felt. Such a thing is possible. It is like striking a man thousands of blows with toothpicks. It would not hurt him, if they struck him with one at a time. But suppose all the toothpicks were in the form of a club, and the man were struck. It is plain to see that he would be hurt. This homely analogy serves a purpose of showing how the shock features of the current work. But practically, it shows that this induction coil is probably an operator's induction coil with a low resistance primary, and a high resistance secondary, one of a few primary turns, and numerous secondary turns, therefore, converting the voltage of six to that of possibly 300. If you take this same induction coil, use six volts, and a transmitter in the circuit, and speak into the transmitter, it is a question in my mind as to whether you can hold onto the terminals of the secondary during a loud and long conversation and a particularly loud and sharp tone would possibly give you a greater shock than you want. Not all induction coils will do this. It depends upon the relative stepping up power of the coil, that is, the comparative number of turns upon the core in each circuit. It also illustrates the talking electro-motive force. This also leads to the question, Have you ever experienced a like effect from a common battery coil? It will give you a clue to the talking electro-motive force of common battery transmission.

We have had quite a discussion as to whether two condensers in series or two in parallel, each having a capacity of two microfarads, will make a total of four microfarads.—J. W. C.

If a continuous electro-motive force be applied to the terminals of a condenser, a current will flow, large at first and gradually diminishing until the plates of the condenser have been charged to an electro-static difference of potential that equals and opposes the electro-dynamic pressure applied. The electro-motive forces, then, balance, and no current will flow unless there be some leakage between the plates.

It frequently happens that the capacity of a condenser is understood to be equal to the quantity of electricity it will hold. This is not true, for the quantity of electricity a given condenser will hold is directly proportional to the tension of the charge and is numerically equal to the quantity of elec-

tricity with which it must be charged in order to raise the potential difference between its terminals from zero to unity.

The practical unit of capacity, the farad, is too large to express capacities met with in practice, so the microfarad, equal to 1-1,000,000 of a farad, is used.

If two condensers of capacities C_1 and C_2 be joined in parallel the resulting capacity of the combination will be $C = C_1 + C_2$. This parallel arrangement of several condensers is simply equivalent to increasing the number or size of plates in one condenser. An increase in the number of plates results in an increase in the quantity of electricity necessary to raise the potential difference between the terminals of the condenser, one volt, that is an increase in the capacity results. The increase of this is true if two resistances be connected in parallel. For in this case if R_1 and R_2 be the risistances of the two branches the resulting resistance R will be less than either R_1 or R_2 because the current now has two paths.

$$R = \frac{R_1 \ R_2}{R_1 + R_2}$$

or in words, the joint resistance of a divided circuit is equal to the product of the two separate resistances divided by their sum.

If the two condensers be connected in series the capacity of the combination will be,

$$C = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2}}$$

This again is the reverse of two resistances, for in this case $R = R_1 + R_2$. If any number (n) of condensers whose capacities are equal be connected in multiple the resulting capacity $C = NC$. If they be connected in series

$$C = \frac{1}{n} C.$$

So it is seen that joining two condensers of two microfarads each in parallel will make a total of four microfarads.

IMPORTATION OF INDIA RUBBER.

More than fifty million pounds of India rubber, valued at more than thirty million dollars, was imported into the United States last year. In 1890 the quantity was only thirty-three million pounds, in 1880 sixteen millions, in 1870 nine millions, and in 1862, the earliest date at which it was separately shown in the import statements, was only 2,125,561 pounds. This very rapid growth in the importation of crude India rubber is, of course, due to the great increase in its use in manufacturing, both as to rubber garments, shoes, etc., and its use in machinery and as tires for vehicles. Over 100 million dollars' worth of manufactures from India rubber are now turned out from the factories of the country every year, and about half of this total is in the form of boots and shoes. So great is the demand of India rubber for use in manufacturing that not only has the importation grown from two million pounds in 1862 to over fifty millions annually at the present period, but in addition to this the forests of the East Indies are called upon for several million pounds annually of a new substitute for gutta-percha, known as "gutta-joolatong," while at the same time the highways and byways of Europe and other countries are ransacked for cast-off rubber manufactures from which the rubber is "reclaimed" and reused in conjunction with the new rubber from the forests of Brazil, Africa and the East Indies.

Figures just compiled by the Department of Commerce and Labor, through its Bureau of Statistics, show the importations of three classes of material utilized as India rubber in recent years. They show that during the past few years the importations of crude rubber have ranged from fifty to fifty-five million pounds; of gutta-joolatong from five to fifteen million pounds, and of "old and scrap rubber, fit only for remanufacture," from ten to twenty odd million pounds per annum, and of gutta-percha a half million pounds.

The industry of importing and "reclaiming" India rubber for reuse in manufacturing is a comparatively new one, and while it utilizes large quantities of worn-out rubber boots and shoes and other articles of this character from the scrap heaps of the United States, it has only extended to other parts of the world in recent years. In 1893, for example, the total importation of "old and scrap India rubber fit only for remanufacture" was less than a million pounds. In 1896 it was over three millions, in 1898 more than nine millions, in 1900 nineteen millions, in 1902 twenty-two millions, and in 1903 24,659,394 pounds, valued at $1,516,137.

Gutta-joolatong is another comparatively new material which may be utilized as a substitute for or in conjunction with India rubber. It is a product of the East Indies, chiefly the island of Borneo, located not far from our Philippines, and in the form in which it is imported is described as "whitish in color, looking something like marshmallow candy, smelling strongly of petroleum and oxidizing on exposure to the air, becoming hard." The same description says: "It is not a substitute for gutta-percha or India rubber, but is used chiefly as a filler in manufactures of India-rubber gum and gutta-percha." The importation of this newly developed aid in the manufacture of India rubber has increased from six and one-half million pounds in 1899 to fourteen million pounds in 1903.

A very large proportion of the India rubber imported into the United States is produced in Brazil. Over one-half of the total is imported direct from Brazil, while considerable quantities come from the United Kingdom, presumably the products of her colonies, and from Belgium, chiefly the product of the Congo Free State, which is under control of the Belgian government and its industries of this character controlled by the people of that country. Recent reports received by the Division of Consular Reports of the Bureau of Statistics show that the experiments in the East Indies have shown the entire practicability of producing the best Para rubber in territory immediately adjacent to the Philippines from trees transplanted from South America, and suggesting the possibility that the Philippine islands may in time supply at least a part of the growing rubber consumption of the United States.

TELEPHONY IN ABYSSINIA.

Emperor Menelek of Abyssinia, it is stated, is establishing a complete telegraphic and telephonic system in that country. Both have been in operation for some years between the towns of Harar and Addis Abeba, and recently the seat of government has been connected by telegraph with Jibuti, on the Gulf of Aden. There are thus more than 500 miles of telegraph line already at work in the empire, and recent extensions will increase the total length of line in use to about 1,200 miles. A telephone system now connects Asmara with Barromedia by way of Adowa, and Addis Abeba with Ankober. The emperor has given permission to Italians to construct the line from Massowah on condition that it passes by Ankober, where political prisoners are detained. He receives daily reports by telephone from all parts of his empire. The southern frontier is not yet included in the system, but he has given orders that a telephone line 400 miles long shall be constructed there. The necessary material has already arrived in the country and the work of construction will be carried on as rapidly as the conditions will permit.

The Russian and German postoffices have arranged to construct a telephone line between Berlin and St. Petersburg, via Edtykuhnen, on the German frontier, and Wilna, in Russia. The construction will begin in 1904.

PERSONAL

C. A. Gregory has resigned as manager of the Citizens' Telephone Company, Sioux Falls, S. D.

A. B. Ferdinand has sold his telephone holdings in the Sheboygan (Wis.) telephone exchange and toll lines.

F. R. Bryant has assumed the position of advertising manager for the Central Electric Company, Chicago.

D. W. Coons, manager of the Hydra Battery Company, New York, is around again after a severe and painful illness.

E. D. Miller has accepted the position of wire chief with the Daviess County Home Telephone Company of Washington, Indiana.

Rudolph Buecking, manager for Hugo Reisinger, New York, has gone to Europe for a short trip, combining pleasure with business.

A. Frederick Collins has already booked for this season some twenty engagements to lecture, with demonstrations, on wireless telegraphy and telephony.

Frank Jones, a veteran telephone manager of South America, recently visited the United States on his way to London, where he will make his headquarters.

Henry P. Clausen, engineer of the American Electric Telephone Company, has been admitted to full membership in the American Institute of Electrical Engineers.

H. B. Hewitt, representative of the Stromberg-Carlson Telephone Manufacturing Company, formerly at Keithsburg, Ill., is now permanently located at Chillicothe, Mo.

Julius H. West, consulting telephone and telegraph engineer of Berlin, Germany, is visiting this country inspecting the telephone, fire alarm and police telegraph systems.

Ed. Cook, formerly state inspector for the Central Union Telephone Company in Ohio, has accepted the position of city foreman with the Home Telephone Company at Los Angeles.

Fred Hummel is the new cable foreman of the Los Angeles Home Telephone Company. Mr. Hummel was formerly employed by the Toledo (Ohio) Home Telephone Company.

Henry B. Dates, professor of electrical engineering at the Clarkson School of Technology, Potsdam, New York, has been appointed professor of electrical engineering at the University of Colorado.

C. W. Bartlett, the Nebraska representative of the Stromberg-Carlson Telephone Manufacturing Company, is now located at 1635 South Twenty-second street, Lincoln, Neb. Mr. Bartlett's previous address was Kansas City, Mo.

Lewis G. Martin, the well-known cable expert of the Okonite Company, New York city, has returned from the Philippine islands, where he was recently stationed in charge of the laying of the shore end of the Pacific cable at Manila.

The many friends of Thos. G. Seymour, who is well known in the Independent telephone field, will be pleased to learn that he will represent the International Telephone Manufacturing Company in the states of Kansas and Nebraska, with headquarters at Kansas City, Mo. Mr. Seymour was formerly associated with the Kellogg company, but tendered his resignation to take effect August 1, since which time he has been interested in exchange construction work in the Northwest.

Thos. E. Clark, president and general manager, and Ackland Stiling, advertising manager of the Thos. E. Clark Wireless Telegraph-Telephone Company of Detroit, Mich., have been on a trip to St. Louis, Mo., on matters pertaining to the company's exhibit at the St. Louis Exposition. It is their intention to have one of the most attractive exhibits in the electrical line, embodying many features of novelty.

Howard I. Crawford, secretary and treasurer of the Rhinelander Mutual Telephone Company, Rhinelander, Wis., was a recent Chicago visitor. Mr. Crawford reports a great deal of activity among the Wisconsin Independents. In the town of Rhinelander the Wisconsin (Bell) Telephone Company removed its poles and abandoned its exchange, retaining but four telephones in the town for its long-distance connections. This is only another instance of Bell defeat at the hands of Independents.

COMMUNICATED.

Editor TELEPHONY:

I have read with exceeding interest the able article of Mr. Oscar Wentworth Rogers in your October number, in which he compares the respective merits of the manual and automatic systems from what appears to be a rather oblique viewpoint.

Mr. Rogers deducts from the papers that have appeared recently from the pen of Mr. J. J. Nate "that the trouble of increasing rates in increasing plants is due to the necessity of 'scrapping' the present plant *that it may be replaced by a larger plant.* This is due almost wholly to the bewildering multiple system of the manual exchange."

The idea of "scrapping" is distinctively American and applies to every line of mechanical enterprise. The American railway "scraps" its rolling stock at a point where continental policy dictates its use even under a heavier operating expense. Many telephone exchanges in this country have "scrapped" their equipment not because enlargement was *impossible,* but because later systems have been devised in the use of which better service, a reduction in the expense of operation and a reduction in the percentage of depreciation could be secured.

The removing of obsolete equipment and the substituting of up-to-date apparatus, even at great expense, will continue as long as the ingenuity of man can devise apparatus operating at a material net saving.

With the automatic systems in the formative or experimental period of its development, I ask if the percentage to be charged off for depreciation should not be higher than with the manual systems, brought to a high state of perfection through years of careful development. Can Mr. Rogers assure us that "scrapping" will stop as soon as we use the automatic system?

While conservative engineers are charging off from seven to ten per cent for depreciation with manual exchanges, Mr. Rogers only figures six per cent for the automatic equipment and three per cent for conduit instead of four per cent. Why?

In conclusion allow me to state that I have no leanings toward either system and have no "house" affiliations. I desire at the earliest moment to see "depreciation" cover actual wear and not be mainly an insurance against future development. As an interested reader I hope to see in your columns general discussion of "The Manual vs. the Automatic" question.

L. G. LE BOURVEAU.

Chicago, Oct. 20, 1903.

The Chicago Telephone Company's net gain in subscribers for September was slightly more than 1,600. The company expects to have 100,000 telephones in service, city and country, by January 1, 1904.

Telephony.

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Change in advertisements intended for a particular issue should reach the Chicago office of TELEPHONY by the 20th of the month preceding publication. New advertisements can be received up to the 25th of the month.

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CHICAGO, NOVEMBER, 1903.

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TO INDEPENDENTS.

The Kellogg Switchboard and Supply Company is a Bell concern. As such it does not deserve the support of Independents. Every man who lends his assistance to the enemy by supporting the Kellogg company is endangering his own welfare and prosperity. Far-sighted men will not make the mistake of helping to build up what true Independents have tried to overthrow. TELEPHONY'S *position is one of denunciation of the Kellogg company as a Bell concern, not entitled to the confidence or support of Independents in any Independent enterprise.*

WESTERN UNION WINS FROM BELL.

After a twenty years' fight the Western Union Telegraph Company et al. win their suit against the American Bell Telephone Company for an accounting from the Bell company for one-fifth of the thirty-five per cent of the capital stock in a number of subsidiary telephone companies, which the Bell company received as part consideration for licenses issued to such companies to use the telephone. This the plaintiffs claimed was due to them, in addition to twenty per cent of the money rentals that the Bell company had received from such subsidiary companies, under a contract between the plaintiffs and the National Bell company, dated Nov. 10, 1879, whereby the Western Union yielded up to the Bell a monopoly of the telephone business.

The decision was announced by Judges Putnam, Aldrich and Brown in the United States circuit court of appeals on October 7. The decree of Judge Colt in the circuit court, which held that the plaintiffs were not entitled to an accounting for a share of these stocks under the contract, is reversed, and the case is ordered remanded to the circuit court, and a decree entered for the plaintiffs for an accounting.

The amount involved in the suit is large, the plaintiffs claiming at one time that they were entitled to recover about $7,000,000 as their share of the stocks of the companies which the Bell company had received for licenses to use the telephone.

The plaintiffs, in addition to the Western Union company, are the American Speaking Telephone Company, the Gold and Stock Telegraph Company and the Harmonic Telegraph Company, and the decision depended upon the construction of the contract of November 10, 1879. The exact construction cannot be given, because the courts' opinion will not be announced until later.

However, under the contract there was effected a consolidation of the Gray, Edison, Phelps, Dolbear and other telephone patents controlled by the Gold and Stock Telegraph Company, with the Bell and Blake and other telephone inventions owned by the National Bell Company, with the result that the plaintiffs surrendered to the Bell company the further right to engage in the telephone business.

Under the contract the plaintiffs were to receive one-fifth, or twenty per cent, of the rents and royalties received by the Bell company for licenses for telephones in the United States. The Bell company had paid to the plaintiffs twenty per cent of the money rentals which it received from telephone licenses, and that feature was entirely out of the case. The Bell company claimed that was the extent of its liability, and the circuit court took that view.

The plaintiffs have claimed that they were entitled to receive one-fifth, or twenty per cent, of all shares of the capital stocks and securities which the Bell company had received from the licensed companies, upon the ground that the stocks and securities were paid to the Bell company as a part consideration or rental for the exclusive license to use the telephone patents.

Down to 1888 the Bell company had received from sundry licensee telephone corporations thirty-five per cent of their

capital stock, which was alleged to be of a market value of over $18,301,000. The plaintiffs have claimed that this method of taking thirty-five per cent inaugurated a new method or system of doing business, different from that contemplated by the parties under the contract. They further claimed that the stocks so received by the Bell company were part of the rents and rolayties received for the granting of the license to use the telephone, and that it was liable under the contract to the plaintiffs for one-fifth of these shares.

The decision depended largely upon the interpretation of the words "rents or royalties," as used in the contract. The defendant had claimed that the contract defined these words and that they were limited to the twenty per cent of the money rentals from the licensee companies, which it had paid over to the plaintiffs before they brought this suit.

The Bell company had also claimed that the words "rents or royalties" meant standard annual rentals and nothing more, and that under the contract it had the exclusive right to carry on the telephone exchange business and that the stocks which it had received merely represented the consideration for the transfer of a portion of its monopoly of the exchange business to the licensee corporations.

J. H. Benton, Jr., counsel for the Western Union Telegraph Company, says that the decision of the United States circuit court of appeals in the American telephone royalty case, just decided, is final and cannot be taken to the United States supreme court.

When the decision was announced American Telephone and Telegraph Company stock dropped from 127½ to 114½, a decline of $15,000,000. The Bell company is trying to explain and bolster its stock, but investors are becoming wary of anything which bears the name. The telephone monopoly has long since ceased to exist, and the once powerful Bell is on the toboggan.

SPECIAL DELIVERY BY TELEPHONE.

The postoffice department has, during the last five months, been experimenting in the use of the telephone in country districts in forwarding the contents of special delivery letters. The idea was first suggested by Senator Fairbanks, who, during the closing hours of the last session of congress, proposed a small appropriation for the establishment of this new branch of the postoffice service.

The senate was unwilling to make an appropriation, but it did pass a resolution calling on the postmaster-general to report as to the feasibility of the service. About the time congress adjourned Postmaster-General Payne responded to the request by reporting that the telephone was then being used in a few instances to forward special delivery messages from towns to persons living remote from any postoffice, and that the plan was entirely feasible.

At the coming session he will be prepared to submit an additional report encouraging congress to make a moderate appropriation for the service. It is proposed that there shall be printed a special stamp to be used on special delivery letters. Any postmaster in the country who receives a letter bearing this kind of stamp will understand that it is his duty to open the letter and read the contents over the telephone to the person out in the country to whom it is addressed.

The details of the new service have never been worked out, but the postoffice department believes the Indiana Senator has hit on a suggestion that will, in the course of time, become exceedingly popular throughout the middle West, where the telephone has already come into general use among the farmers. The understanding is that the government would not have to enter into contracts with local telephone companies for the transmission of messages. Almost every country postoffice is now connected by telephone with the farmers in the surrounding country, and as both the postoffice and the farmers pay rentals, it is believed there could be no objection to the transmission of contents of letters over the wires without extra charge.

But what a chance for mistakes! What an avenue for the course of neighborhood gossip! Of course, the integrity of the postal officials is not to be questioned. But they are human beings, and in the rural districts, where such special telephone service would be chiefly employed, even the postal card is under a taboo because of the temptations it offers to the mail handlers to secure and impart its information. The secrets of the postal card, however, are insignificant compared with those intrusted to the covers of a letter, and be he—or she—ever so conscientious, the day would surely come when the custody of an important item of neighborhood news would grow too heavy a burden for the surcharged soul.

Then how about the matter of identifying the person at the other end of the wire? There are such things as secrets within the walls of a house, secrets jealously guarded by member from member of the family. What guaranty could the worried postmaster have that he was giving the letter contents to the right person? Voices are not sure guides to identity. The postmaster should not be required, in addition to his present onerous tasks, to commit to memory the notes of the telephone voice of every patron of his office. Else must secret code signals be provided to insure security and certainty.

It is to be feared that the proposition is in advance of the period.

THE NEW BELL PLAN.

When the Bell company was defeated in the federal courts, in its efforts to fasten the grip of monopoly on the public throat by means of patents conceived in fraud and nurtured by a lie, the Independent telephone men who had fought and defeated the would be tyrant congratulated themselves on having ended the Bell power for harm. But it was not for long that the Bell company lay quiet. Scarcely had the clouds of the patent battle rolled away before other and equally nefarious schemes began to ferment in the fertile brains of the guiding spirits of the Bell company.

One plan after another was tried, until the whole matter was concentrated into one fixed purpose. The Bell company knew that it had been whipped in court by a united Independent opposition. It knew that against a united Independent telephone business it could not hope to succeed, so it began to try to undermine the solidarity and harmony of Independents. Some companies it bought up, some it pretended to co-operate with; everywhere it endeavored to set one Independent against another and sought by every means to foster discontent and antagonism. The fine hand of the Bell can be seen readily in almost every Independent disagreement or dispute. Independents should recognize this fact. The Bell company is plotting for our ruin. We can defeat every scheme by standing together, as we did when we fought the Bell company patents in court.

A STEP BACKWARD.

The Kellogg situation has cleared up considerably since our last issue. Forced by TELEPHONY's editorial in our October number, the Kellogg company no longer denies that it is a Bell concern. That simplifies matters very much. No Independent need any longer have any lingering doubts about the situation. The Kellogg company is admittedly controlled by the Bell. The status of affairs is practically this, the Kellogg company says to its former customers, "Yes, we are controlled by the Bell, but we will continue to furnish apparatus to Independents just the same as we did

when we were Independent. If you doubt our word we will give you our bond to do so."

Since the days when the "confidence game" was first invented has there ever been anything so refreshingly condescending as this proposition on the part of the Kellogg company? It would seem as if the game was so plain that every Independent would see through it at once, yet there are still a few who bite at the bait. For the benefit of those *few*, and to the credit of Independents, it can be said that they get *fewer* every day, we have a word or two to say.

The Bell company has never suffered seriously from enlargement of the heart. It has been troubled with some very severe cases of colic and indigestion, but its adamantine hardness of heart has never varied. The Kellogg proposition to furnish apparatus to Independents is designed to make dissensions in the Independent ranks. Like every other Bell plan it has worked just the opposite result from what was intended. If anything was needed to unite Independents, the Kellogg masquerade would furnish the reason.

It is evident that the Bell is using the Kellogg company as a tool to draw Independents into the Bell net. It is said that the Kellogg company will continue to sell Independents apparatus and will give a bond that it will do so. Has the Bell company's word or the Bell company's bond ever stood in the way of a Bell company plan to destroy an Independent? Independents would not take the Bell company's word on any subject relating to Independent prosperity, and the Bell company's bond, or the bond of its tool, is no better than its word. Ask any man who has had business dealings with the Bell, whether or not such a trifle as business honor or a contract has ever prevented the Bell company from taking every advantage and pursuing every method, however contemptible, to gain its ends.

When a concern has to give a bond, as the Kellogg company does, that its word is good, a bond to guarantee its business honor, the word of that company is not worth the taking and it has no honor left to guarantee. The bond itself is no better than the word, and the honor that it pretends to protect. It is only a subterfuge and a snare.

Kellogg telephones and switchboards are not as good as Independent telephones and switchboards, and never can be so long as the Kellogg company is a Bell company. A progressive man cannot stay with the Bell company or any company which the Bell controls. The Kellogg company, since the day it became a Bell company, has been going backwards, is going backwards to-day, and will keep on going backwards every year until Independent factories remember it only as a thing of the past. It cannot succeed against Independent genius and inventive progress. It has already ceased to be a legitimate competitor for Independent business.

The Bell curse blights and dwarfs the minds of the men who live under its shadow. The brains of the Kellogg company will be like the brains of every other Bell concern, dulled and crushed out. The Bell idea is opposed to individual genius. It is the idea of a machine. It throttles invention, thwarts progress and discourages ambition. There will be no incentive to a Kellogg man to improve Kellogg apparatus, no matter how sadly it may need it, and no matter how good his idea. Almost every recent improvement in the telephonic art is the result of Independent inventive ability. Any student of TELEPHONY's patent digest will recognize this fact.

The Kellogg supporter or adherent must cut himself off from the march of progress. No matter how far advanced he may be at present, a few years will see him left far behind. The Kellogg company will bask in its own contentment to leave well enough alone. The good men at Kellogg's will leave the poor, old, slumbering wreck, and the Kellogg company will peacefully sleep itself to death.

If this result does not come about, the Bell company will take an inventory of stock, select everything in the Kellogg apparatus that is worth taking, and will toss back the husks for Kellogg customers to gnaw at. Is it reasonable to suppose that the Bell company, which so jealously guards every patent or claim it has from Independents, which has brought innumerable suits in court against Independents on the most ridiculous and impossible grounds, will overlook the opportunity for causing trouble which the Kellogg company presents?

The Bell company will use the Kellogg company to squeeze every dollar it can out of Independents and as a club to drive Independents over to the Bell as sub-licensees, and then it will kick its former customers to one side and spurn them with contempt.

Bond or no bond, guarantee or no guarantee, the Kellogg company will not and cannot protect its customers from Bell intrigue. To be a Kellogg adherent is to take a long step backward, to sacrifice, or at least endanger, Independence, and to be a tool of the Bell in working your own ultimate destruction.

THE BELL LESSON OF FINANCE.

Persistent bear rumors with regard to leading Bell stocks have been circulating in the world of money during the past few months. Straws show which way the current is drifting.

The American Telephone and Telegraph Company issued $22,000,000 of new stock and endeavored to float it broadly over the United States. But the dear public would not buy, and the New England contingent of old reliables were forced to buy the stock which they had tried to sell to others.

On top of that discouraging failure to secure new money for the relief of the old burden bearers came a most disheartening slump in the stock itself, which declined about 20 points from what had been regarded as its steady value. This shrinkage from the high price to the present low one amounts to the very respectable sum of $80,000,000.

But the American Telephone and Telegraph Company has not been alone in this mad scramble for lower values. There have been other disasters.

The New England Telephone and Telegraph Company failed to float a $3,500,000 issue of stock, alleging that market conditions were not propitious, although this amount of stock has been issued yearly for so long a time as to have become proverbial.

The Bell Telephone Company of Philadelphia decreased its dividend rate from 8 to 6 per cent, alleging that it had fought the Independent company in Philadelphia, and that the fight had cost a great deal of money. It announced cheerfully, however, that the Bell won out. The very vigorous Independent company, however, does not look as if it had been beaten. On the contrary, an unprejudiced observer would say that it was victorious.

The poor old Central Union is still wallowing in the mire, and the Michigan Telephone Company is to be sold at auction to the highest bidder on November 4.

All along the line the word has been passed to stop construction work and extensions until spring. It would be unkind to suggest that money is running short or that the Independents have made things so hot for the Bell that it is losing ground faster every day.

It is amusing, in view of the foregoing facts, to hear the Bell company's advice to the public not to buy Independent stocks. After having cost its stockholders in various Bell companies the trifling loss of about $250,000,000 during the last year or so, the Bell concern has the effrontery to call Independent stocks unsafe.

The lesson for Independents is to avoid the Bell schemes for watering a good plant to death. A reasonable amount of moisture is not so bad, but floods of water will drown every prospect of honest dividends.

The public, which has money to invest in telephone securities, would do well to look over a list of Independent bonds and stock *which pay honest dividends on an honest capitalization,* and let the Bell inflated values severely alone.

THE TELEPHONE ON INTERURBAN RAILWAYS

The telephone is coming into very general use in connection with the operation of interurban railways. On all well equipped systems the cars are dispatched by telephone, as it is found to be the most satisfactory.

The Indiana Union Traction Company, which operates an extensive system in southern Indiana, has a model car dispatching system. In describing it the *Street Railway Journal* says:

As far as possible the limited as well as the local cars operate without stopping for telephonic orders from the despatcher, that is, as long as the cars are on schedule time and meet according to the time-table, there is no necessity for reporting to the despatcher except at terminal points. This company has a telephone despatching system in which each car carries its own telephone instrument, and hooks in on the line at terminal boxes located at sidings. There is one despatching line which is kept entirely for despatching, and no other business is conducted over it except in emergencies. The despatcher's head receiver is connected at all times across the despatching line, so that no bell signals are necessary to call the despatcher. The train crews simply hook in and begin to talk, provided that no one else is talking over the line. It is notable that around Indianapolis the method of carrying telephone despatching instruments on each car rather than placing the instruments in booths along the line is almost universally employed, the Indiana Union Traction Company having set the example. This practice is all the more notable because of the trouble which has been experienced in many places with telephone instruments carried on the cars. In fact, some of the other lines around Indianapolis have experienced considerable trouble in maintaining their car telephones in operating condition. The officers of the Indiana Union Traction Company, however, do not seem to be aware of any special difficulties in maintaining car telephones. An investigation of the matter leads one to the conclusion that the success of the Indiana Union Traction Company with car telephones is simply due to the fact that it does not neglect them or expect them to remain in good order indefinitely without any attention, as do some of the smaller companies. A. S. Richey, electrical engineer of the company, when questioned as to why the company experiences so little difficulty with telephones carried on the cars as compared with other companies which have tried the same practice, said: "Of course, if we neglected our telephone instruments, and had none in reserve, we should have trouble from interference with the operation of the road, just as we should have trouble with any other piece of apparatus treated in a similar manner. It is simply a question of seeing that the cars are kept supplied with instruments that are in good working order. If a man reports his telephone instrument as not giving satisfaction it is immediately exchanged for one which has just been overhauled. The telephone company keeps a supply of instruments in good order at all times, and as fast as instruments become defective they are taken in to be overhauled and good ones put in their place. If a man has trouble in talking with the despatcher between terminal points he can usually use the instrument of some other car at a meeting point, which will enable him to get to a terminal where he can change his telephone. Of course, telephones give out and have to be overhauled, but I am not aware that our cost of maintenance is excessive. We simply consider it as we would the maintenance of any other piece of apparatus, and do not expect the telephones to maintain themselves."

TELEPHONE GIRL SAYS "O."

The telephone girl is progressive. For years and years in repeating a number which had a zero included she would always call it "ought." For instance, if a subscriber called for "twenty-four thirty," the telephone girl would repeat "Two-four-three-ought." When some subscriber who had a little feeling of compassion for the King's English, which was being so cruelly murdered right before his ears, would gently object and say, "Two-four-three-naught," the girl would again repeat, "ought," and tell the subscriber to "look in the dictionary."

But the world moves. The "naught" is commencing to be realized in the most exclusive telephone circles. It could not be expected that the telephone girl would surrender all at once. She has fought for that "ought" too long to drop it immediately, and thus confess that she has been wrong.

So, while she dropped the "ought," she has taken up "o" instead. So now she repeats 2430 in this manner, "Two-four-three-O."

It is a splendid victory for English undefiled. Optimists can now see dawning that glad day when the telephone girl will say "naught" right out loud.

SOUTHERN INDIANA CONVENTION.

The annual convention of the Independent Telephone Association of Southern Indiana will be held at Evansville, Indiana, Nov. 10 and 11. Arrangements are now being made for the gathering. The association is composed of seventy members from various points in Southern Indiana, where Independent telephone systems are in operation. At the coming meeting all these members are expected to be present and many others from the adjoining portions of Kentucky and Illinois. Over 100 visitors are expected to attend the meeting. There will be a display of the telephone apparatus manufactured by various companies for the use of Independent telephone systems.

The object of the association is for the improvement of the Independent telephone service in the territory covered by its membership and better the condition of the Independent companies which have representation in its membership, while at the same time the service to the people is improved and the rates kept as low as is consistent with the best service. The meetings are designed for the mutual benefit of all the members and subjects of interest will occupy the time of the convention, persons competent to deal with them leading in the discussions. The session will last two days.

The officers of the Independent Telephone Association of Southern Indiana are as follows: President, G. A. Kienle, Huntingburg; vice-president, Charles D. Knoefel, New Albany; secretary, W. Pickhardt, Huntingburg; treasurer, T. M. Thom, Lamar.

TELEPHONE WARNS OF CRIME.

Woven into the tragedy of the lonely manor house at Dingman's Ferry, Pa., when Victor E. Bevans and his wife, Mary, were shot by an assassin lurking in the darkness outside their home, is the extraordinary part played by the telephone which notified the neighbors miles away of the deed in the Bevans home.

His wife dying, himself nearly unconscious, Bevans staggered to the party line telephone, used jointly by fifteen families scattered for miles around. One turn of the crank rang the bell in every house. With the last ebbing effort of strength Bevans twisted the handle madly and shouted into the transmitter. Then he sank down.

Elvin E. Smith, one of the neighbors, went to answer the ring, and he heard Bevans say:

"Mary and I are both shot; I through the nose."

"Are you seriously shot?" inquired Mr. Smith.

"Yes; for God's sake, get us some help."

Bevans in the excitement failed to hang up the receiver, and Mr. Smith heard the screams of the wounded woman.

Miss Jennie Frace, the telephone operator at Newton, says she staid on the wire until neighbors reached the Bevans home, and that she heard no sound in the house except groans and calls for help.

Alarmed by the furious ring, fifteen people sprang to the telephone and heard and acted at once. When they arrived at the house there was little they could do. Mrs. Bevans is dead, and her husband will likely die in six hours.

The entire population of Sandystone township, N. J., is now under arms, searching the woods trying to find the assassin.

The First Electrical Publication

There appeared in the May, 1903, TELEPHONY a reproduction of the first telephone journal published in the world. It marked the beginning of an industry which has grown to proportions never dreamed of by the men who entered the telephone field twenty-five years ago. The publication reproduced was *The Telephone Journal,* dated October, 1878, Volume 1, Number 1. It was owned and edited by the Chicago (Bell) Telephone Company, and gave the status and development of the industry up to that date. To those who are familiar with the present system of the Chicago Telephone Company it is hard to believe that at the time of this journal's appearance the telephone was little more than a toy, and its use was so restricted that the telephone company made the suggestion to its subscribers, that where short messages were to be sent, time could be saved by sending them to the central office for transmission, from whence they could be repeated to destination. This was in the days when the telephone was young, and this first issue of *The Telephone Journal* has an historical interest. In order that the chain might be complete we published in the September, 1903, TELEPHONY, a reproduction of the first issue of an Independent telephone journal. *The Telephone,* published by Henry C. Strong, at Washington, D. C. The first number bears date of October, 1885. This was nearly ten years before the Independent movement assumed any proportion. At the time of *The Telephone's* first appearance its editor, Henry C. Strong, now of Chicago, was assisting the government's attorneys in a suit against the Bell Telephone Company for alleged fraudulent contentions in procuring its patents. Mr. Strong says: "The paper was suppressed and was not permitted to circulate because of the article entitled 'The First Telephone Patent,' the attorneys claiming that the appearance of this particular item would prove disastrous to the government's interests." The Telephone Publishing Company, Chicago, purchased the copyright of *The Telephone* several years ago and this property was taken over by the Telephony Publishing Company when it purchased the Telephone Publishing Company. The possession of the first issues of these publications, aside from the historical interest, have a considerable value, on account of being very rare, as far as known not other copies being extant.

The reproduction on this and the opposite page of the first issue of *Electricity,* the oldest electrical paper in the United States, will interest the entire electrical fraternity, while telephone men will read it with especial interest. The item entitled "The Telephone Turn" shows the condition of the industry twenty years ago, when there were less than 200,000 telephones in use in the United States. How the industry has grown since then is a matter of common knowledge. The wonderful strides made in the past ten years are without precedent in any industry. This great activity has been due to the aggressive fight made by Independent manufacturers and operators against the unreasonable monopoly claims of the Bell company. Had the telephone remained in the hands of the Bell there would have been comparatively little progress made, as its policy was to build systems, only in the large cities and towns, where high rentals could be secured and connect these cities and towns by long distance lines. This was the most profitable field,

ELECTRICITY

A JOURNAL OF INVENTION AND NEWS. ELECTRIC SCIENCE.

VOL. I, NO. I. CINCINNATI, O., SEPTEMBER, 1883. $1.00 PER YEAR. 10c PER COPY.

NEW PROCESS.—A new process for manufacturing glass insulators is being successfully employed by a Detroit firm. The crude material of which the glass is made is first put into a revolving drum, from which, after receiving while therein four applications of heat, it is run into an auxiliary furnace, ready for the glass-blowers to work. This is accomplished with a saving in fuel, time and labor. The machinery in these works is novel, and is said to work to perfection.

A FOUNTAIN OF LIFE.—It is asserted that a magnetic spring has been discovered at Bell Brook, Ohio, on the line of the Miami railroad, which is performing miracles by its wonderful curative properties. A correspondent describing it, says that an ordinary Barlow knife placed in the water for a few minutes, is, upon withdrawal found to be powerfully magnetic. Ponce de Leon wasted his time searching in Florida for the fountain of life; he should have pursued his researches in Ohio.

FLOATING ILLUMINATION.—The Cunard Company's new steamship, Aurania, is lit throughout by electricity diffused through nearly 1,000 lamps of the Edison pattern. The power for these is derived from four separate engines. This vessel is of 8,000 tons capacity. A battery of eight steel boilers, capable of furnishing 10,000-horse power, drives her splendid engines. She has developed a speed in a recent trip of 18¼ knots, or 22½ miles per hour, and carries 2,400 tons of coal in her bunkers to supply fuel during a trip across the Atlantic. Her officers and crew number 260 persons. Captain Watson, the naval constructor of the company, personally superintended her building throughout. She left port on her first trip July 20. Messrs. Thompson, of Clydebank, Scotland, were her builders, and furnished her engines. She carries 700 first-class passengers, and 600 emigrants. She is, indeed, a vessel to be proud of.

A SIMPLE TELEPHONE OR MICROPHONE PLATE.—One or more plates of the desired shape and size are cut out of a piece of sheet-iron. After dressing, rub them well on both sides with a dry cloth; this is essential to obtain an equal thickness, as otherwise the greasy spots left by handling, would prevent a uniform action of the acid. It is better, also, to treat only one plate at a time. After wiping the plate well it is plunged vertically, so as to be submerged, into a bath of azotic acid. Acid that has been used several times in a Bunsen battery can be used, or else the azotic acid of commerce, with the addition of one-fourth of water. The plate must be taken out frequently to ascertain the thickness. When the proper thickness is obtained, the plate is well washed in water, until the coating of blackish rust or oxide has completely disappeared; it is then let dry and one or more coatings of black Japanese varnish given on both sides to prevent oxidation. In this way plates may be obtained as thin as desired, and of all shapes and sizes. When membranes are used in microphones this is no slight advantage.

ELECTRIC LIGHT IN THE MINES.—The *Arizona Citizen* says: "A number of mining companies in Arizona Territory are about to adopt the electric light to facilitate operations underground, as well as on the surface, notably the Silver King Mining Company, the Howell Smelting & Mining Company, and the Conger Mill & Mining Company. At the Silver King Mine it is proposed to use four 3,000-candle power Brush lights above ground and two below, together with 25 small incandescent lamps. The dynamo located near the main shaft will supply the current, descending 800 feet to the lower levels of the mine, to the arc lights and storage boxes, from which latter the Swan lamps are to be connected by small copper wires. Fixed lamps are to be suspended from the roofs of the galleries, and the portable lights are to be attached to flexible conductors for convenience of shifting. These lights are to burn continuously night and day. In the reduction works of this company both large and small lights are also to be used, a seperate dynamo and two storage batteries supplying the current. The arc light circuit in the Silver King Mine will be about half a mile in length.

EVIL EFFECT FROM IMPURE COAL GAS.—The item following is a powerful argument in favor of the use of electricity for store and warehouse lighting, even if its benefits extended no further, and its superiority over gas was not already demonstrated. The following was adduced from evidence furnished before a Parliamentary Commission in England: "A silk merchant testified that during the winter months, when a large amount of gas was burned, the more delicate colors of silk fabrics were destroyed. Metals also are injured, a thin film forming upon them which has to be daily removed, else the surface is corroded. A bootmaker exhibited some of his goods which had become perfectly rotten by the action, it was believed, of the sulphuric acid yielded by the gas. Two inches of leather cut from a pair of boots was found on analysis to contain 10 grains of oil of vitriol. The inquiry was confined to London gas, but it is not unlikely that the gas of other cities frequently contains impurities of like character."

THE TELEPHONE'S TURN.—The rapid adoption of the telephone since its first practical application, is unprecedented. It went into general use all over the world almost instantly. Nothing could better demonstrate the necessity for such an invention than this universal appreciation. New York City, of course, leads in the number, by some 6,000 subscribers, Chicago being second in the list with about 3,000, while Cincinnati numbers about 2,000. Of course, these figures do not include private lines. It is estimated that telephones are now in use in the United States by nearly 200,000 subscribers. Absolutely correct figures are unattainable, as there are many little towns and small manufacturing centers using from 30 to 50 telephones, of which no account has been received, but 200,000 is not at all an excessive figure. From statistics compiled by the *Compagnie Internationale des Telephones* regarding the telephone business of the world, we learn that Paris has 2,422 subscribers; London, 1,600 subscribers, Amsterdam, 700, Stockholm, 672, Vienna, 600, Berlin, 581, Brussels, 450, Turin, 410; Copenhagan, 400, Mexico, 300, St. Petersburg, 145, and Alexandria 118. While the annual subscription in Paris is about $126, in London, $105, and in the provincial towns of France $84, the rates lower to $63 and $42 in Belgium, $28.35 and $27.30 in Italy, and $25.20 in Switzerland. A calculation of the ratio of the number of subscribers to that of inhabitants to each town reveals a goodly number of small towns in America where there is a telephone for every 20 inhabitants, in Chicago and Zurich the proportion is about one per 200, in New York, one per 500, in Brussels, one per 800, in Paris, about one per 1,000, in Berlin, one per 2,000; in London, one per 3,000, and in St. Petersburg, only one per 4,000. The United States offers the largest field for utilizing the telephone, as a matter of course, and its development, consequently, has been greater. In this country the demand is rapidly increasing, in some cities at the rate of 20 per cent., and yet the telephone is but six years old—a mere baby.

and the crying need for the universal telephone did not appeal to the Bell monopoly. The Independents, on the other hand, believed in the telephone for the many instead of the telephone for the few. The question of high rentals was not the all important one. The invention belonged to the people, and the success of the Independent movement has been due to the fact that it aimed to serve all the people. Making it possible for everyone to have the benefits of telephone service. These early publications, *The Telephone Journal, The Telephone* and *Electricity* were the first heralds of the telephone. While its possibilities were then undreamed of yet the foundation was being laid for an industry which in its development meant the revolutionizing of the commercial world. The toy of twenty-five years ago has developed into one of the greatest necessities of the day, and is used in all countries and under nearly all conditions. From the first line with a telephone on each end the present wonderful telephone systems of the world have been evolved. Nothing accurate can be given as to the telephone wire mileage in the United States. It is something almost incomprehensible. If the figures could be secured they would be startling. Nearly five million telephones are in service in this country alone, and the majority of them have been installed by the Independent companies and are being operated by Independents. It is stated by conservative men that the investment in the telephone field has reached a half a billion of dollars. When these early journals were started did their editors have any idea that the telephone business, in a short quarter of a century, would grow to such proportions as it has. It is safe to say that they did not, and it is an equally safe prediction that no one to-day has the least conception of what the industry will be at the end of the next quarter century.

ELECTRICITY. SEPT. 1883

WHAT HE THINKS OF IT.—Mr. Charles Dudley Warner thus expressed his view on the subject of industrial and scientific schools—a view which is daily gaining ground among intelligent persons in every walk of life. "The story of the enormous growth of industries in the north cantons of Switzerland is not new to you. There was nothing promising in the soil, the climate, the situation of that rocky and sterile region. But an industrial school of mining, engineering, chemistry, and the applied arts was established, and the immediate result of it was an industrial growth and prosperity almost unexampled in Europe. It was all created by that school and its superb training. That school made skilled workmen and inventive brains, and the men who came out of it transformed that country into one of the busiest and most profitable in the world. I can tell you another open secret. Little Connecticut, which De Tocqueville called 'that beetle spot on the map,' a state where everything is manufactured, from a pin to a steam engine; a state of wondrous invention and ingenuity; owes much,—very much, and will owe more, year by year,—to the training of her youth in the Scientific School at New Haven."

PROMOTING THE ELECTRIC LIGHT.—According to the *Electric World*, Mr. Thomas A. Edison, when questioned as to whether he intended to give up inventing and experimenting for the present, said: "I have come to the conclusion that my system of lighting, having been perfected, should be promoted, and that I could take hold and push the system better than anyone else. It is so complicated that I do not feel like trusting it to new and untried hands, because science and dollars are so mixed up in it. After the right to introduce the light has been bought by outside parties, I take a contract to erect buildings, open mains, etc., and after 30 days I turn the establishment over to the local company for such money as has been agreed upon. I want to put the light up in six places like Utica every month from now on. I want to accomplish what I set out to do; namely, demonstrate the utility of sub-divided electric light by means of incandescent lamps, and entirely replace gas. It is proving just as I expected. It will take a year or more yet to complete the work of perfecting the entire system. After that is done I shall resume inventing, but just what I shall invent I am unable to say. It will be in the same line of business I am pursuing. I have heretofore found a lot of things I dare not touch. In experimenting I had a good many things I never looked for."

EARLY TELEPHONE WHISPERINGS.—It is a matter of general interest and time that we should definitely know who was the first to discover and make known the true principle of talking over telegraph wires by electricity with a "closed circuit." Oracles say that the first patentee and supposed inventor of the speaking telephone did not invent the instrument, and did not discover the "closed circuit" method of transmitting and receiving spoken words over the ordinary telegraph lines. During the year 1858, when "The Story of the Telegraph" appeared in book form, containing a detailed account of the successful lying of the first Atlantic cable, the author said: "England and America are placed within whispering distance of each other." And again: "What justification could there be for war, when the disarming message (whispered) may be wafted across the mighty Atlantic quicker than the sunbeam's path or the lightning's flash." When the telephone fulfills the prediction of 1858 then the true principle of the instrument will be known and understood. Prof Tyndall, the eminent scientist, once expressed his opinion of the principle of the telephone, as he understood it. But he only repeated the supposed theory of the hearing and transmitting telephone. The true principle has never been made public. Prof Tyndall's speech has the following: "The next application of Faraday's discovery of magneto-induction is found in the telephone. In this instrument a series of electric currents are developed by the movements of a thin plate of iron in front of a steel magnet, around whose end a wire is coiled. As the thin iron plate vibrates to the impulse received from the voice of one speaking near it, the lines of force about the magnet are caused to move, and so cut across the coils of wire, and consequently develope in them electric currents. These fluctuating electric currents, carried by a telegraph wire to a distant place, modify as they vary the attraction of a similar magnet for a like thin iron plate, and thus this plate repeats the motion of the first one, and gives to the ear of the listener the motions which constituted the sounds in the spoken words uttered against the first iron plate. Modifications in form or arrangements of parts have been made by various experimenters and inventors, but the same principle pervades all the telephones of this class." The speech closes with these truthful words: "It is well to remember that those discoveries and applications which struck the public mind and excited so much discussion, often come from men whose sole stimulus is an intellectual one. As to the philosophic aspect of the question, there is a small cohort of social regenerators,—men of high aims, and who are held in great respect,—who would hand over science and scientific men to a heirarchy which would determine the particular subjects that the scientific men ought to pursue. Where that heirarchy was to get its wisdom, they never explained. Those writers denounced and scorned all reference to what they considered to be far apart from human needs, and yet, upon sensible conceptions—as of molecules, for instance—sometimes depended the greatest discoveries. When the feeble magneto-electric spark was first introduced, an Oxford don expressed great regret that such a discovery should have been made for, he said, it put a new and facile instrument in the hands of the incendiary. Let them imagine that heirarchy of which he had spoken watching Faraday puddling over his magnets. They would certainly have sent him back to his bookbinder's bench as a far more dignified occupation. Yet it was Faraday's spark that now shone, and which is hoped will illuminate our quays and halls, and esplanades and squares, and possibly, our homes."

SUSPENDED ANIMATION.—Under this heading the Yorkshire *Post* publishes a letter signed A. Allison, M.D., in which the writer says: "When apparent death supervenes from strangulation, or noxious gases, a judiciously directed galvanic experiment will, if anything can, restore the activity of the vital functions. This wonderful agent now takes its place among the ministers of health and life in cases of suspended animation. In extreme cases the surgeon will require to expose certain vital nerves, in order that the phrenic cord may be acted upon by the metallic conductors of the battery. If we place this risk of the operation in competition with the glory of success, the former will weigh as nothing with the intellectual humane. During my student life in Glasgow, before the passing of the Anatomy Act, several executed criminals were sent to the university within 15 minutes from the time of being cut down. On one occasion the body of Clydesdale, the murderer, was subjected to a series of galvanic experiments with a view to test their influence upon the brain and nervous system. Several gentlemen there present concluded that but for the loss of blood in removing the atlas vertebra, life might have been restored, as the hangman failed to dislocate the neck of his victim. The thief who suffered along with him was seized with violent convulsions caused by fracture of the neck. From this we infer that the deep Marwood drop of from eight feet to 14 feet, with fracture of the neck, is a desecration which ought not to be tolerated. The exclusion of atmospheric air from the lungs, as in drowning and simple strangulation, is the proper line of practice in such cases. The narcotism produced by undecarbonized blood upon the brain points to an easier death than that produced by fracture, or the redundant drop. Persons who have been rescued from drowning in a state of incipient death, describe the sensation to be painless. At the risk of becoming sensational, I must revert to the case of Clydesdale in illustration of the value of galvanism in cases of suspended animation. This murderer, while under galvanic excitation, rose up, rolled his eyes, about, and struck at the bystanders and nearly overturned one of Dr. Ure's assistants. During the galvanic ordeal full laborious breathing commenced, and was continuous with the electrical discharges. Every muscle of the countenance was thrown into fearful action, and ghastly smiles united their hideous expressions in the murderer's face—surpassing the wildest expressions of an actor. He seemed to point to the different spectators, some of whom thought he had come to life, and one gentleman fainted. The practical deduction in favor of galvanism is to utilize the force as a therapeutic agent. Miners who are exposed to the action of noxious gases, and persons who frequent bathing quarters, ought to have easy access to the action of galvanism.

LANGUAGES AND THE TELEPHONE.

An interesting statement was made recently in a cable message to the New York daily press to the effect that the telephone employes in Paris have found that French is more easily understood over the telephone than English. It is said that in telephoning between Paris and London during a storm conversation in English is impossible, but French is easily understood.

This effect might be due either to the speaker or to the telephone line itself. The electrical constants of a long line or a cable tend to smooth out and destroy the electrical waves which are produced by the voice acting upon the transmitter and which by means of the receiver reproduce more or less exactly the original words. On the other hand, while the effect just mentioned must be present in all cases to some extent, it need hardly be recalled how surprisingly will the telephone reproduce not only spoken words, but even that peculiar quality of each voice which enables another to recognize it.

If it be the fact that the French language lends itself to transmission by telephone better than the English—distinctness of articulation and acuteness of hearing being alike in both cases—the difference must then be inherent in the language itself. Now a spoken language consists of sounds (phonetic elements), intonation and stress.

The greater part of the sounds (vowel and consonants) employed are common to both languages; but a few are peculiar, for example the hard and soft *th* and the flat *a* (as in hat) do not exist in French; while the nasal *n* (as in *mon, pain*), the narrow final *u* and the palatal *r* do not exist in English. There seems no reason to suppose that these sounds are more difficult of transmission than others.

There is a difference in intonation or *timbre* of voice, no doubt, and it is possible that this might be the cause. This could be tested by having an Englishman and a Frenchman to repeat the same sentences in both languages. If the Frenchman's English was transmitted better than the Englishman's French the difference would seem to be in the *timbre* of voice.—*Electrical Review.*

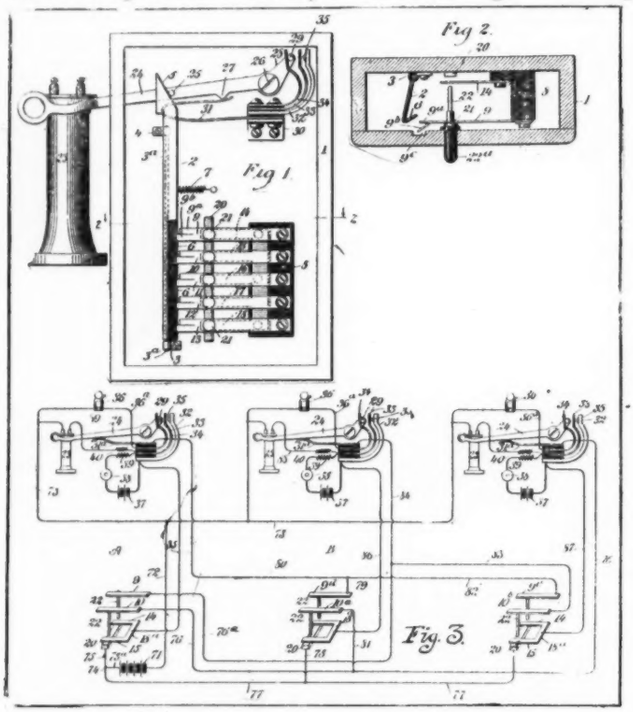
In 1894 the total valuation of telephone and express companies was about $2,000,000.

DIGEST OF TELEPHONE AND KINDRED PATENTS

Information concerning any patent will be furnished without charge by addressing Edward E. Clement, Editor of this Department, McGill Building, Washington, D. C.

739,636. G. F. Archer, switchboard for telephones.

This is a subscriber's switch for intercommunicating systems. The mechanical parts are shown in figures 1 and 2, and the circuit in figure 3. The entire switching apparatus is enclosed in a box *1*, and includes the individual push-buttons *21-22a* and the switch-hook *24*, with its contact springs *31-32-33-34*. The backstop or spring *32*, and the spring *33* serve to close the local circuit of the transmitter *38*, and the spring *34* co-operates with the pin *29* on the hook-lever *24* to close the bell circuit when the receiver *23* is hung up. Backstop *32* is also connected at each station by wire *85* to a comb *18a*, whose teeth *14-15*, etc., lie under the ends of the pins *22* of the individual push buttons, this comb serving as a bus connection for all or any of the individual springs *9-10-11-12-13* to the secondary circuit in calling and talking.



739,636—SWITCHBOARD FOR TELEPHONES.

Beneath the comb springs extends a common bar or contact *20*, connected to the main calling battery *71*, common to all the stations. Each spring *9-10-11-12*, etc., is connected to an individual wire passing to the same spring and all the other stations but one, and at that station to the contact spring *31a* of the switch hook. Vertically pivoted and standing opposite the ends of all the contact springs *9-10-11-12-13* is a common detent *2*, having a spring *7*, tending to throw it over to the right, but normally held out of engagement with the springs by the pin *25* on the switch hook lever, which works against a cam face or chamfer *5* on the upper end of the detent bar. The parts are adjusted so that when any button *22a* is pushed in all the way its pin *22* will come into contact with the spring *14* (or *15-16*, etc., according to the station selected) and will force this spring against the battery bar *20*, the shoulder *21* at the same time forcing in the spring *9* until it snaps behind the edge *6* of the detent bar *2* (the receiver being taken off the hook); but when pressure on the button is relaxed contact with the bar *20* is broken, the detent *2* then holding in the individual spring *9-10*, etc., and a connection remaining from that particular spring through the pin *22* to the spring *14-15*, etc., and through the comb *18a* to the local set by way of wire *85*.

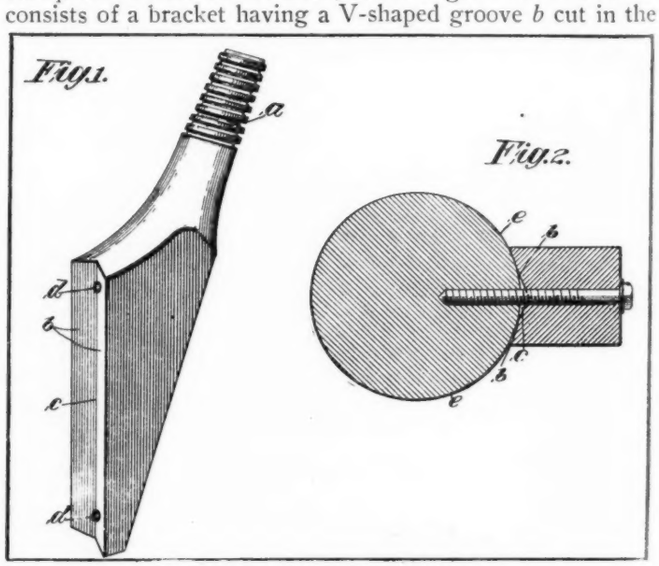
Suppose station *A* has called station *B* by pressing in the first button as above described, calling current will pass over the following circuits: Battery *71*, *73a*, *75*, *20*, *14*, *22*, *9*, *76a*, *84*, *31a*, *24*, *29*, *34*, *36a*, *36*, *73*, *72*, back to battery. The receiver at station *B* being taken down and pressure on the push button at station *A* having been relaxed, a talking circuit is closed as follows: From receiver *23* at station *A* to the secondary *40* of the induction coil, *33*, *35*, *32*, *85*, *14*, *22*, *9*, *76a*, to station *B*, *84*, *31a*, *24*, *29*, *33*, *40*, *88*, *23*, *73*, back to station *A* and to the receiver thereat.

At the end of the conversation both receivers are hung up, both detent bars *2* are thereby forced back, and all parts are restored to normal position as shown in the figures. In case the wrong button is pushed by mistake, the mere pushing of the right button will push back the detent *2* and restore the one first pressed, only the last button pressed in being held.

As a modification a centrally pivoted detent bar is shown having two rows of push buttons and springs co-operating with its opposite edges. This form is claimed, the single detent being old.

740,005. J. F. Gilliland, insulator bracket.

Mr. Gilliland resides at Adrian, Mich., and has assigned this patent to Albert B. Dick, of Chicago. The invention consists of a bracket having a V-shaped groove *b* cut in the face that is to be applied to the pole, so as to avoid the necessity of cutting a flat place on the pole. The edges of the bracket face rest on the pole, as shown in Fig. 2, leaving a channel *c*, through which moisture can drain off, this being an incidental but important advantage.



740,005—INSULATOR BRACKET.

The bracket can be tightly set up on a pole of any size without cutting, and is equally adapted to use on a flat surface if desired.

740,053. A. J. Springborn, telephone registration system.

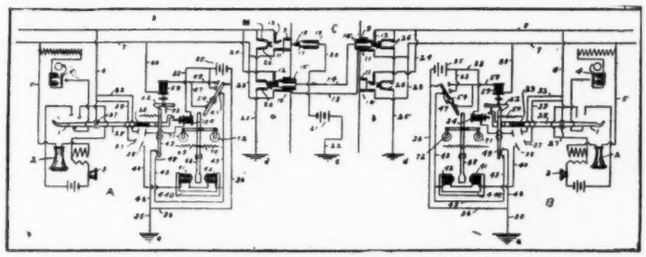
It is now pretty generally conceded that measured service is the only arrangement equitable to both subscribers and the telephone companies. The adjustment of measured service charges is not easy, if absolute equity is to be preserved. At the present time it is not customary to charge a calling subscriber for a call that is not answered, or if the line wanted is busy. The percentage of such calls varies of course in exchanges of different sizes, and in the same exchange at different hours of the day. It is worthy of consideration, however, that if a subscriber is to pay strictly for what he gets, the ultimate application of the principle would result in his paying something for even those calls which bring him no connection. In many cases, where the party has so many calls that his line constantly tests busy, it might be well to charge him something for every call he does not answer. This would encourage him to put in another telephone, and would help pay the company for time wasted by the operators. The whole subject is well worthy of study, and Mr. Springborn, the present inventor, seems to have thought so. He stops short of the ultimate limit, however, and contents himself with providing two registers at each subscriber's station, one recording the calls that are answered, and the other recording the answers of "wrong parties." We fear, however, that even with this limited function the present apparatus and circuits are too complicated to be adopted.

In the figure herewith *A* and *B* are two subscribers' stations, and *C* is the central station to which they are connected. At the sub-stations the switch hook *1* is pivoted at *27* and is normally locked to prevent its rising and closing the talking circuit, by the movable core of a solenoid *34*. When this solenoid is energized the hook is permitted to turn, the end *28* moving downward and causing the contact *29* to bridge across the pairs of contacts shown at *30-31* and *37-38*.

At each station two registers, *71* and *72*, are provided, of the well-known cyclometer pattern, each worked by a lever, and the ends of both levers connected across by links to the upper end of a pivoted lever *68*. When the lever *68* is turned to throw its upper end to the right at station *A* it works the register *71*, and when moved to the left it works the register *72*. The lever is worked one way and the other by two magnets *41* and *42*, both of which respond to current from outside the station, one to current from the central office and the other to current from the called subscriber's station. The talking sets and their connections, the subscriber's bills, and the cord circuits *13-14* with the operator's apparatus, are of any usual or desired type.

The operation of the system is as follows: Suppose *B* to call by taking down his receiver. His hook lever *28* turns on the pivot *27*, causing the contact *29* to bridge the contacts *30-31*, closing the following circuit: *31, 34, 33, 35, 36*, ground at *e*, to the central office, ground at *d, 25, 26* (which are contacts in the jacks), line wire *8*, back to the sub-station, wire *6, 32, 30, 29*. Current from battery *35* energizes solenoid *34*, which pulls back its core and unlocks the hook lever *28*, permitting it to move farther down to bridge the contacts *37-38* and to close the local talking circuit. The operator at central answers the call and receives the number wanted in the usual manner, the only special point to be noted being this, that each plug has a tip *18* of insulating material which separates the springs *26* when the plug is in a jack. Having completed the connection, say to station *A*, the operator rings as usual, and when *A* answers the following circuit is closed: From battery *35* at station *A* by wire *33*, through solenoid *34*, to *31, 30, 32, 6*, line wire *8* to central, *24, 12, 14, 12*, line wire *8* to station *B*, wire *6, 39, 37, 38, 40, 41, 42, 43, 49, 46, 36*, ground at *e*, through the earth to station *A* at *e, 36*, to battery *35*. The magnet sets *41-42* are polarized, and this current is of proper direction to throw the upper end of the lever *68* to the left, whereupon the register *71* will record the call. At the same time, inasmuch as this circuit includes the solenoid *34* at station *A*, the latter unlocks its switch hook and permits it to close the talking circuit.

In order to prevent any possibility of interference from earth currents and also to prevent the interruption or false registration that might be due to other parties, as on a party line, means for breaking the circuit to ground after registration, are provided. When *B's* lever *68* is swung to operate the register as described, it turns a lever *54* and closes contacts *61-62*, sending current from *B's* battery *35* as follows:



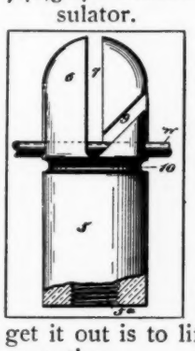
740,053—TELEPHONE REGISTRATION SYSTEM.

36, earth from *e* to *e* at station *A, 36, 46, 48, 43, 54, 57, 59, 60, 7, 23*, through jack and plug, cord conductor *13*, the second plug and jack, line wire *7*, to station *B, 60, 59, 58, 54, 63*, to battery. The solenoids *59* being energized, hooks *52* are lifted, and the levers *49* swing to break the ground circuits at *48*. When the telephones are again hung on the hooks, the pins shown push the levers *49* back into latched positions.

The locking solenoids *34*, prevent cheating by jiggling the hooks. In case of a wrong connection, which registers as soon as the subscriber answers, both subscribers hang up, the calling subscriber complains, and the operator at central inserts a plug connected through cord *20* to a special battery *21*, which sends reversed current to the subscriber's station and through the magnets *41-42*, throwing the lever *68* so as to work the mistake register *72*.

The march of progress is from the complex to the simple. We trust Mr. Springborn will not get discouraged, but will continue to march.

740,314—Charles B. Robertson and John J. Robertson, insulator.

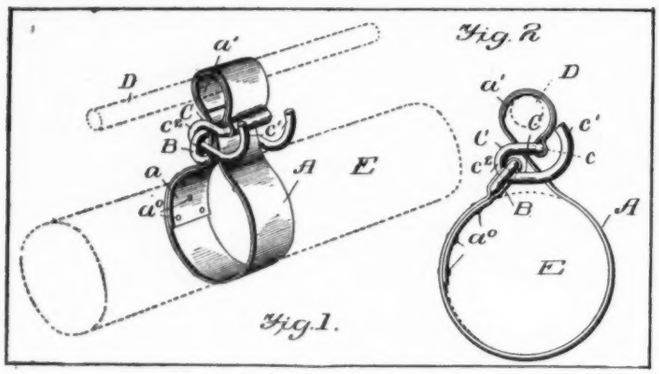


This is a locking insulator which requires no tie-wire. It has a cross slot *7* and a through slot *9*, the latter having side openings on opposite sides, and these openings being inclined to prevent the wire working back and out. In practice the insulator is screwed down on the peg to a quarter turn of being tight, and the wire is dropped into the slot *7*. The insulator is then turned home and the wire hooked in through the inclined opening into the cross slot *9*. The only way to get it out is to lift it up and turn the insulator back at the same time.

740,326. J. J. Smith, cable hanger.

This is an improvement in strap cable hangers for supporting cables from messenger wires. The strap *A* is carried up around the messenger wire, the end being returned on itself and carrying a bent wire *C*, formed into a double hook *c1 c2*. The other end *a*, is also returned on itself, enclosing a bent wire *B* whose ends project and form eyes. This lower end is carried around the cable *E*, and bent up

as shown until the hooks *c1* and *c2* can be turned through the eyes. As seen in figure *2*, the greater the pull on the eyes *B*, the less the possibility of the device becoming unhooked. In other words, in order to turn the hook back the weight of the cable must be lifted.

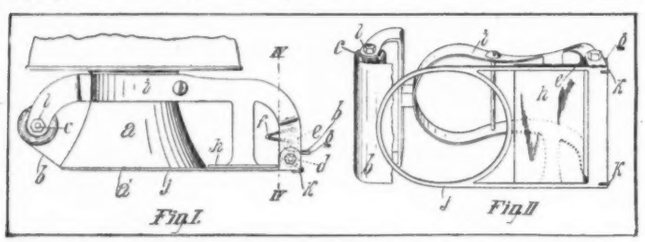


740,326—CABLE HANGER.

This device is not only ingenious, but it is strictly commercial.

740,512. S. J. Ballard, appliance for sound transmitters.

This is a roll paper holder to be applied to transmitter mouthpieces and the like for hygienic purposes. The sheet metal frame *i*, has its ends bent over and carries pivoted between them friction rollers *e* and *d*, as well as the knife edge *g*. A frame *j* is also pivoted on the frame *i* on the ends



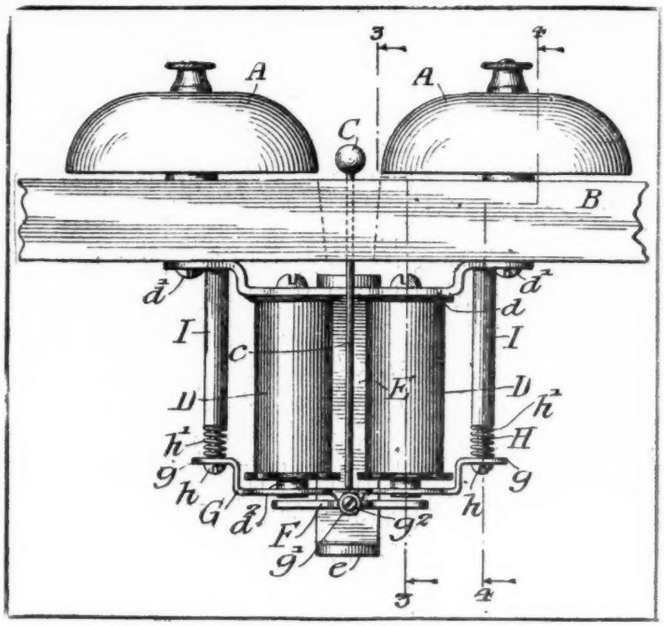
740,512—APPLIANCE FOR SOUND TRANSMITTERS.

of the spindle of the roll *d*, and is normally held in the position shown by tension springs *k*. The paper roll *c* is pivoted at the left, and the paper *b* is led across the mouthpiece under the tension frame *j*, past the edge of plate *h*, between the tension rolls *d-e*, and out. Each user pulls the paper along to get a clean spot, and thereby exposes recurring ads.

740,744. F. B. Cook, polarized electric bell.

To be accurate, this is an improvement in the "ringer," and to get down to a fine point, it is an improvement in the ringer armature adjustment. The instrument is of the type having side posts, and the ends of the cores protrude through holes in the armature yoke. According to the method followed by some manufacturers the yoke is adjusted on the side posts by nuts that screw up and down and held by lock nuts when adjusted. According to others, the yoke is supported on the core-ends and adjusted thereon. Mr. Cook's invention looks like both and works like neither. His ringer has the usual side posts *I-I*, and armature *F*, the latter carried in a yoke *gl*, whose supporting plate *G* has its ends carried on the side posts. Instead of nuts, however, these ends are engaged underneath by spring *h'*, *h'*, and are held down by the screws *h*, *h*. The adjustment is effected by the screws *h*, *h*, working against the constant pressure of the springs *h'*, *h'*; and the same pressure maintains the adjustment constant when once secured.

Mr. Cook is so well known that personal comment seems superfluous. He is an inventor of considerable prominence, and is now in business for himself in Chicago. If he adds the present invention to his commercial output, its efficiency will soon be settled. The only question that arises out of the design is as to the permanency of the adjustment without locking means. It would seem that the constant



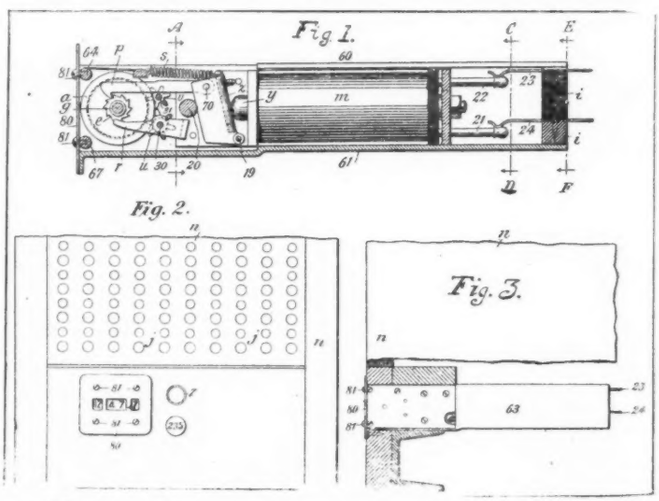
740,744—POLARIZED ELECTRIC BELL.

jarring of the frame of the ringer, with the constant pressure exerted by the springs, would tend to gradually work out the screws and entirely lose the adjustment.

740,889. B. F. Merritt, timing device for telephone switchboards.

The object of this invention is to provide a means for timing telephonic conversation and indicate the elapsed time even when of extreme brevity, the indication being in hours, minutes, and decimal divisions of a minute, for ready valuation in decimal currency.

The invention includes a series of four rotating wheels or



740,889—TIMING DEVICE FOR TELEPHONE SWITCHBOARDS.

disks, each bearing numerals upon its periphery. Progressive movement is applied to the first wheel, which periodically advances the second, the second advancing the third, and the third advancing the fourth, the four wheels indicating respectively tenths of minutes, units of minutes, tens of minutes, and hours. The progressive movement is initially applied to the tenths-of-minutes wheel through a

propelling pawl and ratchet. The pawl is operated by an electro-magnet in an electric circuit containing a circuit-closing device operated by a clock beating seconds. The circuit-closing device in this clock closes the circuit ten times per minute. This advances the first wheel of the indicator ten steps per minute. The first wheel advances the second wheel once per minute, the second wheel advances the third wheel once every ten minutes, and the third wheel advances the fourth wheel once every six steps, which is once per hour.

The device employed for advancing one wheel one step at fixed points in the rotation of the adjacent wheel consists of a pinion having an even number of teeth alternately wide and narrow. This pinion is located so as to engage on the pitch-line with a toothed wheel fixed to the driven wheel. A one-notch disc is fixed to the driving wheel. A broad tooth of the pinion rides upon the periphery of this disc and drops into the notch periodically. A disc having two teeth is fixed to the one-notch disc. The teeth straddle the notch. When the broad tooth drops into the aligned slot, due to the coincidence of the notched disc, the toothed wheel, and a broad tooth of the pinion, the two teeth of the added disc referred to couple the preceding narrow tooth of the pinion with a tooth of the notched wheel and the driving and the driven wheels step ahead together.

To provide for advancing one wheel ten steps for a complete rotation and the adjacent wheel operated thereby twelve steps per rotation, as in the case of the units-of-minutes wheel and the tens-of-minutes wheel, a gear wheel is provided having twenty-four teeth fixed to one and a wheel having twenty teeth fixed to the other. Each wheel is advanced two teeth for each step. A pinion is located in position to engage the teeth of the tens-of-minutes wheel. This pinion is held and then advanced by the units-of-minutes wheel.

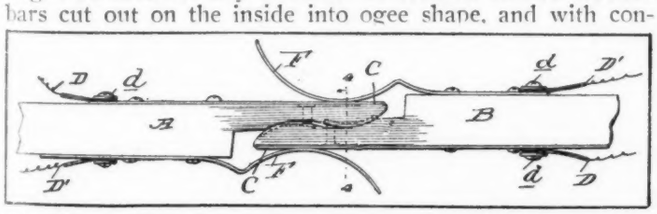
Figure 1 herewith, is a side view of the device, enclosed in its casing *61*, of sheet metal, the side being removed. Figures 2 and 3 are a face view and a sectional view, respectively, of a switchboard with the device inserted.

The face plate *80* has openings to expose the numbers on the wheels, and the entire mechanism is gotten up in one unit, as clearly shown in Fig. 1, the wheels *a*, etc., with the operating pawl, the armature *x* and all the connecting parts, mounted on and enclosed between side plates of iron, secured to the magnet structure, the terminals being taken out in pairs at the rear as shown at *21-22*, springs *23-24* being mounted in the frame *61* and making contact with the terminals *21-22* when the device is slid into place.

So far as appears from the specification, this device is merely an electrically driven clock. As a suggested addition, a starting and stopping attachment should be added, working like those of a stop watch. This would save addition and subtraction on the part of the operator.

741,052. C. Mahon, automatic coupling for electrical conductors.

This is an automatic coupling for train circuits, but it might be used for any circuits. It consists of two wooden bars cut out on the inside into ogee shape, and with con-



741,052—AUTOMATIC COUPLING FOR ELECTRICAL CONDUCTORS.

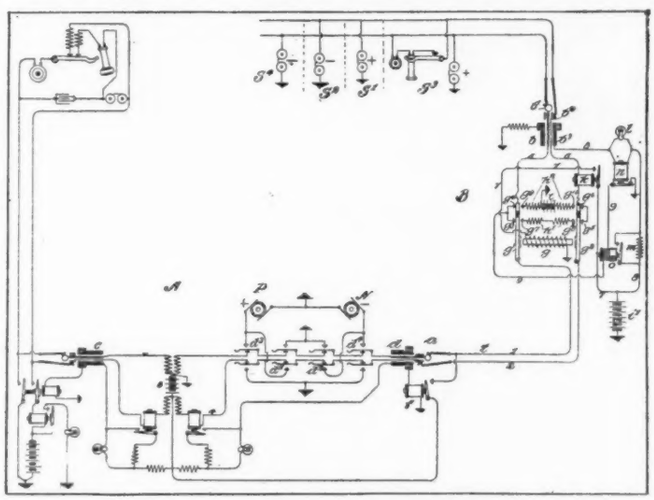
tact springs mounted over the cut out portions. These springs are shown at *F*, and co-operate with contact plates *C* on the flat faces of the bars. When uncoupled, the springs *F* press inward against pins connected through the wood with the flat plates, so as to short circuit, each its own car or other circuit. A wear-plate is set into each inner face at its front edge.

741,114. W. W. Dean, apparatus for telephone trunk-lines.

A great objection to the general use of trunk-lines, as in transfer systems, has been the duplication of work required by the operators. Two operators must perform mental acts, and must perform physical acts as well. This objection extends also to trunking between exchanges. In this case the division of labor is anything but economy. In most trunking systems the *A* operator initiates the connection, and the *B* operator completes the connection, rings the subscriber, and supervises until disconnection. In most trunks a repeating coil is introduced, and while this is designed to be efficient for talking currents, it is not efficient for low frequency ringing currents, and it will not transmit, unaltered, pulsating selective currents.

By the present invention the *A* operator supervises, rings and controls the connection by signals.

In the figure, a subscriber's line is shown at the left, con-



741,114—APPARATUS FOR TELEPHONE TRUNK LINES.

nected through the usual cut-off relay and line relay to a common battery. The type of connection is that of the Bell Telephone Company's common battery relay system. The plugs *c* and *d* are connected by the cord conductors *3* and *4*, with a bridged repeating coil and battery *e*. Ringing keys *d1-d2-d3-d4* are connected so as to send plus or minus current through one side or the other of any line or trunk-line in order to select a given station on a four-party line. Such a line is shown extending from station *B*.

The trunk-line *1-2* between stations *A* and *B* extends from the jack *a* through armatures *g1-g2* and normally through the contacts *g3-g4* and *g5-g6* directly to the trunk plug *b*. When this plug is in a jack its sleeve *b3* connects a grounded battery *i'* through resistance *m* and the parallel connected lamp *l* and relay *n* to the jack thimble and ground. The relay *n* controls a circuit *9* containing a relay *o* and extending to the contact *g3* and thence normally through the trunk conductor *1* back to station *A*. A magnet *g*, controlled by relay *k* (which is controlled by the called subscriber) when excited pulls in the armature *g1* and *g2*, breaks the through connection, and bridges the repeating coil *h1-h2*, and the battery *i*.

The operation is as follows: The subscriber on the left calls, the operator inserts plug *c*, and finding the number requires trunking, inserts plug *d*, after communicating with operator *B*. The latter operator inserts the trunk plug *b*, and the *A* operator then rings, all connections being exactly as shown in the drawing. When the called subscriber answers, he bridges his telephone set, closing the line circuit,

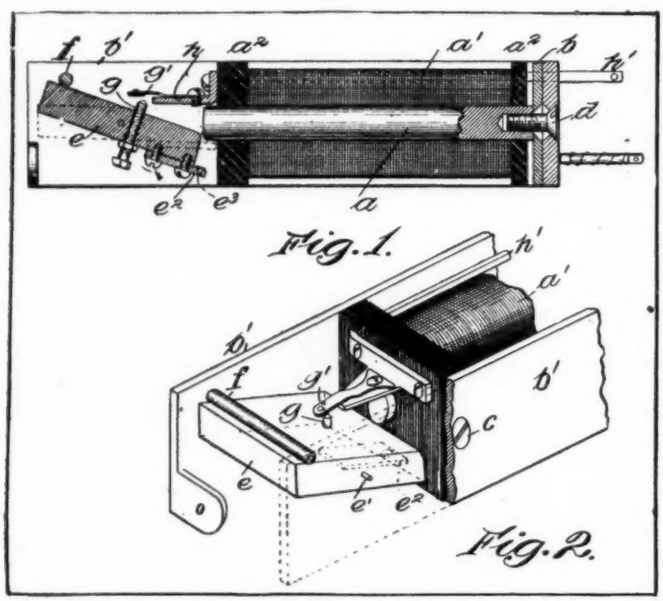
and relay *k* takes current through the trunk from battery *e*. This closes circuit *7* of relay *g*; and this pulls up armature *g1* and *g2*, bridging the repeating coil *h1-h2*. The winding *h1* takes current from battery *e* and works the cord relay to put out the supervisory lamp at station *A*.

Current from battery *i* through resistance *m* energizes relay *n*, but not the lamp *1*. When the subscriber hangs up, relay *k* loses current, relay *g* is deenergized, the repeating coil is cut off, and the supervisory lamp at station *A* lights. When the plug *d* is then withdrawn, relay *f* (connected to the trunk jack) lets go its armature, current flows from battery *e* through trunk line *1* to circuit *9* and through relay *o*, which closes its armature circuit to shunt resistance *m*, permitting lamp *1* to light, and thereby signaling the *B* operator to disconnect. When she does so, relay *n* lets go its armature, breaks circuit *9*, and the parts are all restored to normal.

Mr. Dean is one of the foremost inventors of the day, possessing a deadly certainty in his methods, and a wonderful intuitive faculty of perceiving ultimate functions in a maze of proximate circuits and functions. He has been connected with the Kellogg company for some years, and is also retained by the Consolidated Fire Alarm Company of New York. The present invention is assigned to the Western Electric Company. It is hardly in line with Independent methods, although its numerous relays are interesting in their various functions; and we have no doubt he has better things on hand.

741,115—W. W. Dean, relay.

This is another ingenious design of Mr. Dean's, assigned to the Western Electric Company. It comprises a sluggish relay which will act strongly and certainly under the influence of low-frequency alternating ringing currents. A U-shaped iron frame *b'-b'* is secured to the magnet core *a* at its read end, through the cross plate *b*. The arms *b'-b'*

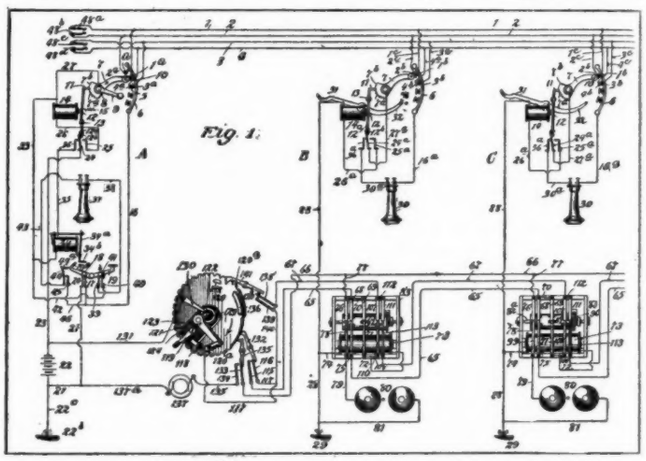


741,115—RELAY.

extend forwardly a considerable distance beyond the magnet core, and between them is pivoted, on trunions *e'*, the heavy soft iron block *e*. This is unbalanced so that it normally lies as shown in Fig. 1, with its outer end against a stop pin *f*. When the magnet is energized it turns the block into the position shown in dotted lines, the screw *g* making a rubbing contact with the spring *g'*, thus closing the circuit to be controlled. The stop *e2* has a copper pin *e3* to prevent sticking.

741,282—C. B. Smith, telephone system.

This is what might be called a voluminous patent. There are six sheets of drawings and seventeen printed pages of text, with thirty-four claims. Upon first reading the description one is reminded of the Arizona farmer who came from his sun-baked, arid country and stood by the banks of Niagara. His exclamation was, "Lord, what a waste of good water!" Upon consideration, however, we believe there may be a sound motive for the series of inventions that have been patented in the name of Mr. Smith. The gentlemen interested in these inventions are New Yorkers, and conditions in New York are peculiar. The writer has had occasion to consider these conditions and their bearing on the location of exchanges for the island of Manhattan. Trunk lines, and indeed lines of any kind, are expensive luxuries, for ducts in the streets are worth pretty nearly their weight in gold. Bearing this in mind, it is plain why Mr. Smith has been so anxious to save line wires. The underlying idea in the present as well as the preceding inventions



741,282—TELEPHONE SYSTEM.

is that of having only as many lines as would be in use for a given number of subscribers at any one time. That is, for an exchange of five thousand subscribers, Mr. Smith would provide approximately 750 pairs of line wires, together with a few selecting and signaling wires. He then connects a great many stations, perhaps all the stations, to all the lines, upon the principle of an intercommunicating system, and provides each station with means first to select an idle line, and second to work over that line and select the subscriber wanted. The drawbacks in such a system must be apparent at a glance. Great complication in apparatus, liable to make trouble; this apparatus scattered at five thousand separated points; constant liability of interference between subscribers endeavoring to select and signal each other; total lack of control, both commercially and in an engineering sense, by the company over its connections; the impossibility of locating troubles by any ordinary tests, nor in any way without interrupting the service of the entire system. These are a few of the objections apparent, and any one of them is fatal to the scheme. It is obvious that the time is coming when there must be some system adopted in New York that will increase facilities without increasing the congestion beneath the streets, but we do not believe that New York will ever have its telephones connected up on the factory or intercommunicating plan.

Referring to the selected diagrams herewith, we find Mr. Smith has introduced a central office into the scheme, and while some details of subscriber's apparatus are covered, the major portion of the description relates to the central station apparatus and the general operation. In Fig. 1 *A* is a central station, while *B* and *C* are subscribers' stations, which may be multiplied *ad libitum*, all connected to one set (or two pairs) of line wires *1, 2, 3, 4*. In addition to these

line wires three others, *65*, *66*, *67*, run to all the stations, the first being a selecting wire, the second a ringing wire and the third a restoring wire.

At the central station and at each subscriber's station is a switch *7*, *8*, *9*, *10*, by which the selection of an idle line *1-2* or *3-4* is made. This is shown in Fig. 3, and comprises an arm *7* connected to the local circuits on one side, a long contact *6* connected to these circuits on the other side, and a series of springs *1a-2a*, *3a-4a*, etc., adapted to be squeezed between and make contact with *7* and *6* as the arm is turned

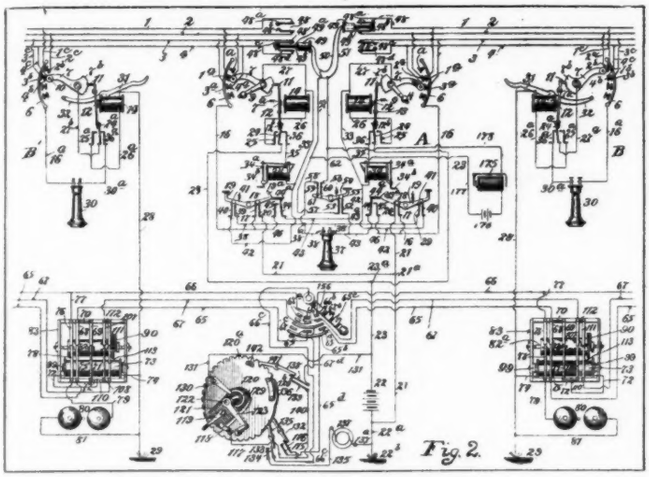


Fig. 2.

741,282—TELEPHONE SYSTEM.

around by means of its handle *9*. A clock train and spring return the arm to its uppermost position when released. It is controlled by a magnet *14*, whose armature *12* has a pin *11* that normally rests on the smooth part *7b* of the heel of the arm *7*, which also has ratchet teeth *7a*.

The idea is that when a subscriber takes down his receiver, whether in answer to a call or to make a call, his switch-hook lever *32* will release the arm *7* and permit it to fall. When it reaches the contacts corresponding to the line with which the central office is connected the magnet will get current through the arm *7* and to ground, from battery *22*, and will stop the arm. The central arm, when set around, will stop at an idle line because its magnet unlocks its arm when a ground is on, locking it only for an idle line.

Having selected an idle line as thus indicated, the particu-

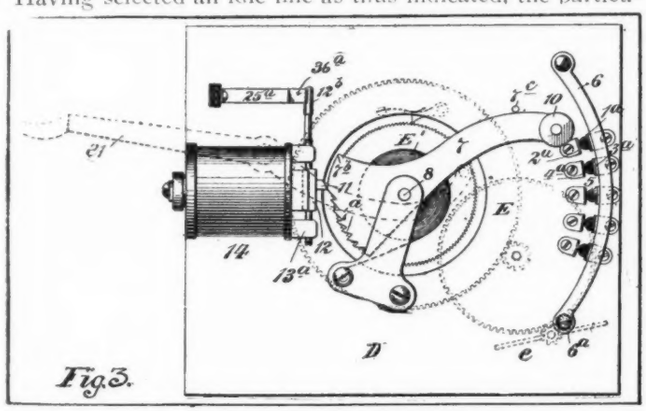


Fig. 3.

741,282—TELEPHONE SYSTEM.

lar station wanted (which is not yet connected to that line) is selected over the wire *65*. A dial selector with teeth and contacts to make and break the several circuits for selective ringing and clearing out is provided at central, as shown at *120*. A pin or plug is set in a hole corresponding to the station wanted and the handle *123* is turned to this point. This first sends an impulse over wire *65*, from battery *22*, and through the first station *B* by way of springs *68*, *69* (normally closed), *71*, *72*, magnet *73*, *74*, and by wire *28* to ground. The wire *65* stops at the first station until put through. The above-mentioned impulse causes the magnet *73* to turn the drum *82*, opening springs *69*, *71*, and closing *68*, *75* and *76*, *78*. The latter is the ringing circuit, and current from generator *137* passes to the station by way of switch *133*, *134*, wires *66-77*, *76-78-79*, bell *80*, and to ground. Current through the third wire *67* again energizes magnet *73*, for clearing out, and turns the drum into normal position.

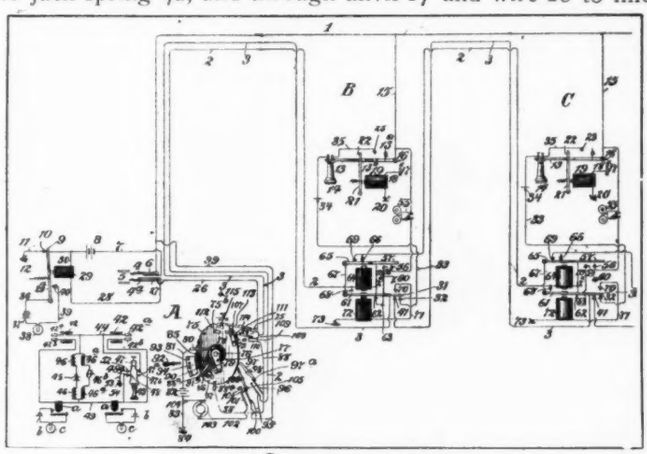
It should be observed that a second impulse over the wire *65* would pass on to station *C* and there to ground, turning its drum and putting the circuit through to station *D*, and so on, a succession of impulses stepping from each station to the next and ringing current when applied going to the last station.

Bearing the above matters in mind, Fig. *2* will lose some of its apparent complexity. The right-hand side of the figure shows exactly the same apparatus as Fig. 1, and so does the left-hand side of the figure. The difference is that a pair of plugs *49*, *49*, with a cord circuit *50*, *51*, are shown, connecting stations *B'* and *B* by way of lines *3*, *4* and *1*, *2*, respectively. The station *B'* called in by getting itself on the same line as the central switch *7*, thereby throwing down the drop *34a* of the central annunciator. The operator answered by pressing the key *19*, cutting in her telephone *37*, and learning that station *B* was wanted, she used her selecting switch over the wires *65*, *66*, *67* to ring the bell *80* at station *B*. Then selecting an idle wire, she connected them by the plugs and cords. During the connection she is able to listen in on the cord by means of key *59*, or on either line by the keys *19*.

We would like to see a complete diagram of this system connected to a multiple switchboard, with a test added, and common battery connections, with perhaps a few interurban trunks. It would be interesting.

741,283. C. B. Smith, telephone.

This is a common battery selective signal lock-out party-line telephone system. The line wires *1* and *3*, together with a so-called "operating line" *2*, pass through several stations *B*, *C*, etc., and terminate at the central office *A*. Wire *1* passes to the jack spring *4* and normally by anvil *6* to battery bus *7* and battery *8*. Wire *3* passes through normally closed contact *25* in the selecting switch *75*, thence to jack spring *4a*, and through anvil *27* and wire *28* to line



741,283—TELEPHONE.

relay *29* and battery. The armature *29a* of the line relay has a contact *9* connected to the battery, and as it is normally back against the stop *10* it grounds that side of the battery through wire *11*. This ground controls the lock-out at the sub-stations. Assuming the parts to be in the position shown, suppose subscriber *B* desires to call. He removes his receiver *14* from the hook *13*, and the heel of the hook lever, *16*, makes contact with *17*, thereby cutting the con-

trolling magnet *19*. The main battery *8* being grounded, magnet *19* receives current over line wire *1* and pulls back the lock *22*, permitting the hook *13* to rise to the limit, closing on contact *23*, and bridging the telephone set across the metallic circuit, whereupon current from battery *8* will flow by the following path: Battery, *30, 29, 28, 27, 4a, 26, 25, 24, 3*, to station *B*, *31, 32, 33*, transmitter *34*, receiver *14, 35, 23, 13, 15, 1*, to central, *4, 6, 7*, and battery. Relay *29* pulls up its armature, lights lamp *38*, and cuts off the ground wire *11*. The operator then plugs in with answering plug *42*, which cuts off the line signal *29* in the jack, as usual. The cord circuit *44-49* has the usual bridged battery *45* and coils *46*. The ground *11* being cut off, all other parties on the line are locked out by their detents *22*. Listening key *47* permits the number wanted to be ascertained, and the connection is finished in the usual way, ordinary supervisory signals *a-c* being employed in the cord.

For selecting the station wanted, the operator employs a switch *75*, similar to the switch mentioned in the preceding patent. This affects magnets *64* and *72* at each sub-station in succession, the idea of stepping successively from each station to the next being employed here also. The so-called "operating wire" *2* passes from a spring *95* of the switch *75* at central to the first sub-station *B*, passes through the magnet *64* and thence by way of armature *61* through contact *62* to ground at *60*. The continuation of the wire *2* starts from armature *61*, goes by wire *67* to armature *65* and through contact *69* out. Suppose the operator wishes to ring station *B*. She turns the switch *75* to send one impulse over wire *2*. This energizes magnet *64* to pull in both its armatures *61* and *65*, and while it connects wire *2* through contact *68* to the armatures *61* and *65*, it breaks the same at *69*, and it also grounds the bell *55* of station *B* from line wire *1* through *15, 55, 56, 57, 58, 59* and *60*. The turning of the switch *75* to send the impulse described also connects the generator *103* to line wire *1*, and rings the bell *55*. The cessation of the impulse through magnet *64* permits the armature *65* to be raised by its spring *66*, but the armature *61* is dead, and remains wherever it is moved. A talking circuit is then established by sendng an impulse over wire *3*, as follows: *3, 31, 70, 71*, magnet *72*, ground *73*, ground *84* at central, battery *82*, switch *75*, to wire *3*. This pulls back armature *61*, and the talking circuit is as follows: Cord conductor *44*, plug tip *42a*, jack spring *4, 1, 13, 23, 35, 14, 34, 33, 32, 31, 3*, back to central, switch *24-25*, jack spring *4a*, plug sleeve *42b*, and cord conductor *49*.

The battery *45* furnishes current for talking and further signaling, and if it is desired to let another party come in on the same line the operator closes the listening key *47*, which grounds the battery *45* at *48a, 52-53-54*. If station *C* or any other beyond is wanted, successive impulses are sent over wire *2*, each impulse working the magnet *64* at a station to cut onto the next station.

741,284. C. B. Smith, telephone system.

This is another common battery lock-out party-line exchange system. Figure 1 is a diagram of the circuits, figure 2 is a front view of a subscriber's switch, and figure 3 is a rear view thereof. The mechanical figures in these patents are given because they are obviously made from actual working apparatus.

The basic idea here is the same as in the preceding patents, being to economize line wires. The switchboard equipment at central station *A* will be understood from the diagram. Each incoming line *1-2, 3-4*, or *5-6*, has the usual equipment, and all are connected to the common battery *16*. A bunch of the line wires pass around to a number of substations, and each subscriber has a switch by which he may connect himself with any idle wire in the bunch, and call central thereover, but cannot break in on a busy wire.

The operation is as follows: Suppose a subscriber at a station, as *B*, desires to communicate. He removes his receiver *43* from its hook *44*, whereupon the latter rises and releases rack *41* and arm *39*, which immediately begin to move, as to the right in figure 1. If the pair of lines *1-2* are idle, as soon as contacts *31a-32a* engage the contacts *31-32*, respectively, connected with conductors *2* and *1*, circuit will be established for magnet *54* to ground at central as follows: From ground *55* at the calling subscriber's station

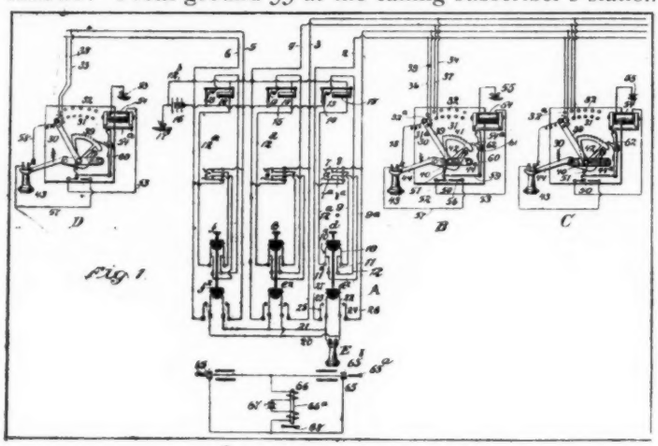


Fig. 1

741,284—TELEPHONE SYSTEM.

through *54, 53, 52, 50, 51, 39, 31a, 31, 33, 1*, to contact *7* at central, thence through *8, 9, 10, 11, 12, 13, 14, 15*, and battery *16* to ground *17*. Armature *54a* will release arm *60*, whereupon the latter will be moved under the influence of its spring and allow dog *62* to engage the first tooth of rack *41*, and thus prevent further movement of arm *39*, thereby holding the contacts *31a-32a* in engagement with contacts *31* and *32* of lines *1-2*, and arm *60* will at the same time move contact *50* to break circuit at *52* and establish circuit at *50-56* through the receiver *43*, whereupon a closed metallic circuit between the calling-subscriber's station and central, including the drop *18*, connected with line *2*, will be established as follows: From contact *50* at the calling station, through *51, 39, 31a, 31, 33, 1, 7, 8, 9, 10, 11, 12, 13, 14, 15*, battery *16*, conductor *12b*, through the magnet of drop *18, 12a, 10a, 11a, 9a, 8a*, and *7a*, to line *2*, thence along line

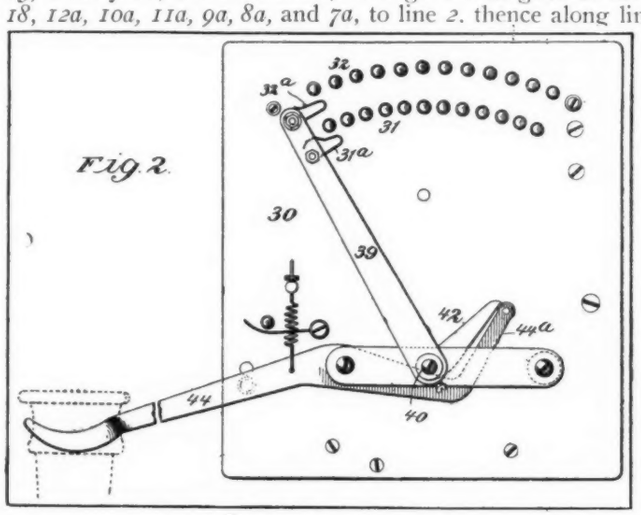


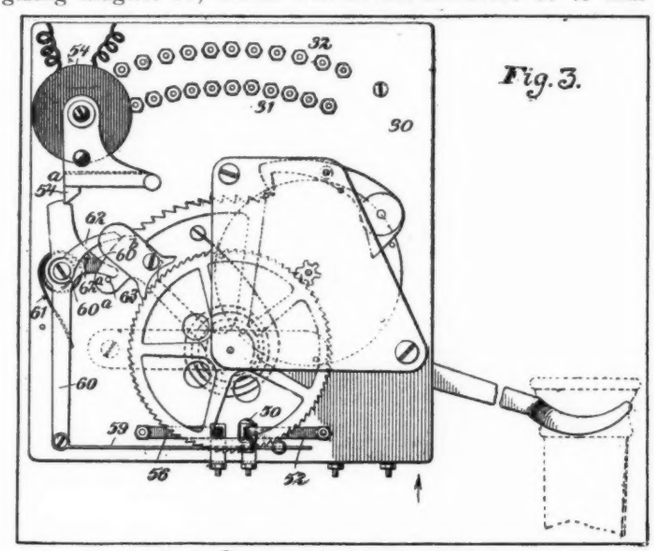
Fig. 2.

741,284—TELEPHONE SYSTEM.

2 to *36* and *32* at *B*, thence through *32a-58*, receiver *43-57* and contact *56* back to contact *50*. The shutter of drop *18* will now fall and break circuit at *13-14*, so that if another subscriber on the same series of lines should attempt to call central his arm *39* would stop in connection with the contact *31-32*, connected with lines *1-2*, because his magnet *54* could not find a circuit to battery and ground at central; but his arm *39* would pass on and would be arrested in connection with a pair of contacts *31-32*, connected with a

pair of idle conductors, through one of which a circuit could be established for his magnet *54* to battery *16* and ground *17* at central. When the operator at central replies to the signal, she first operates the key *d*, which breaks the circuit of lines *1-2* at *10-11* and *10a-11a*, but establishes the circuit of said lines through the receiver *E* at *22-24* and *23-25*, respectively. Being told which subscriber is desired the operator at central calls the subscriber desired by means of a calling-circuit, which Mr. Smith has not considered it necessary to illustrate, but which is presumably the same as in his other systems. The called subscriber thereupon removes his receiver *43* from its hook *44*, whereupon the devices at his station select a pair of idle conductors, and thus operate the corresponding drop *18* at central. The operator at central thereupon connects the jacks of the calling and the called subscribers by plugs and cord in the usual manner. The placing of a plug in the jack *a* at central causes the normal circuit of lines *1-2* to be broken at *7-8* and *7a-8a*, which respectively connect with the tip *65a* and sleeve *65b* of plug *65*, said tip and sleeve respectively, breaking circuit between contacts *7-8* and *7a-8a*. When the subscribers have finished using the line, they hang receivers *43* upon hooks *44*, whereupon the latter will be drawn down and through the projections *44a* and *42* will restore arms *39* to their normal positions, and pins *63* of racks *41* will act on projections *60b* to move arms *60* to their normal positions to be again held by armatures *54a*, thereupon breaking circuits at *50-56* and re-establishing the normal circuits at *50-52* for magnets *54*. The operator at central then clears out.

The battery *67* is shown located between two coils of magnet *66*, the armature *68* being utilized as a clearing-out indicator. Thus while two pairs of lines are in use the current from battery *67* will flow on either pair of lines, energizing magnet *66*, which will attract armature *68* to indicate that the lines are in use, and when both receivers *43* are hung upon their hooks the circuit will be broken, and thereupon the indicator *68* will drop to show that the subscribers have finished.

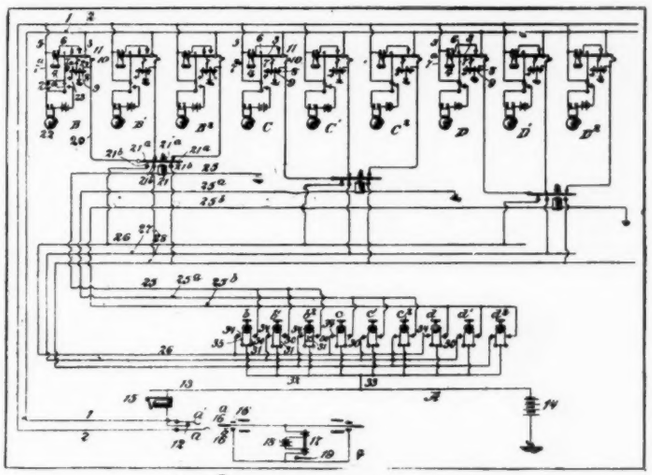


741,284—TELEPHONE SYSTEM.

741,285. C. B. Smith, telephone system.

This is another system along the same lines as those just described. It is the intention to save line wires, and to provide selective and locking-out means for a party line.

In the drawing, *A* is a central station, and *B*, *B1*, *B2*, *B3*, etc., are sub-stations connected thereto. *1-2* are the common line wires for talking, passing through all the sub-stations, and terminating in the central station at a jack *a-a1*, the side *1* of line being normally grounded through the jack-anvil *12* and the main battery *14*. A series of signaling wires *25*, *25a*, *25b*, and a second series *26*, *27*, *28*, extend from the central office to all the sub-stations. At central these wires of both series are connected to the spring contacts of the selecting keys *b*, *b1*, *b2*, *b3*, etc., from which connection is made to the battery *14*. The sub-stations are divided into groups of three, *B*, *B1*, *B2*, being one such group, *B3*, *B4*, *B5*, being another, etc. Each group is controlled as to signals by a relay. Relay *21*, in wire *25*, controls contacts *21a-21b*, from which connection leads in each case to one of the sub-stations of the group on the one hand, and to one of the wires of the second series *26*, *27*, *28*, on the other. Now, in order to select station *B2*, for instance, the operator depresses key *b2*, which connects battery *14* to the wires *25* and *28*. The wire *25* includes relay *21*, which therefore pulls down its armature and closes wires *26-27-28* to their respective stations. But only one bell will ring, for wire *28* alone is connected to battery, it will be noted, at the same time. Thus the combination of any two wires of the two series of wires will select a sub-station for ringing out. For signaling in, the subscriber simply takes down his receiver, thereby closing a grounded circuit from his station to central as follows: *8-9-10-11-3-1-a1-12-15-13-14*-ground. The magnet *9* at the substation is an unlocking magnet similar to those described in the preceding patents. It controls an armature *7*, whose hooked end *6* holds the hook lever *3* from rising farther than to make contact at *10-11*, until the magnet is energized. When the subscriber calls in, the necessary current flows from battery *14* by the path traced. When central is calling the subscriber, current passes through wire *26*, *27*, or *28*, and the pulling up of the unlocking armature also closes the bell circuit *23*. This is broken on the full rising of the hook lever *3*, however. Current may also be supplied from battery *18* when a plug is in the jack.

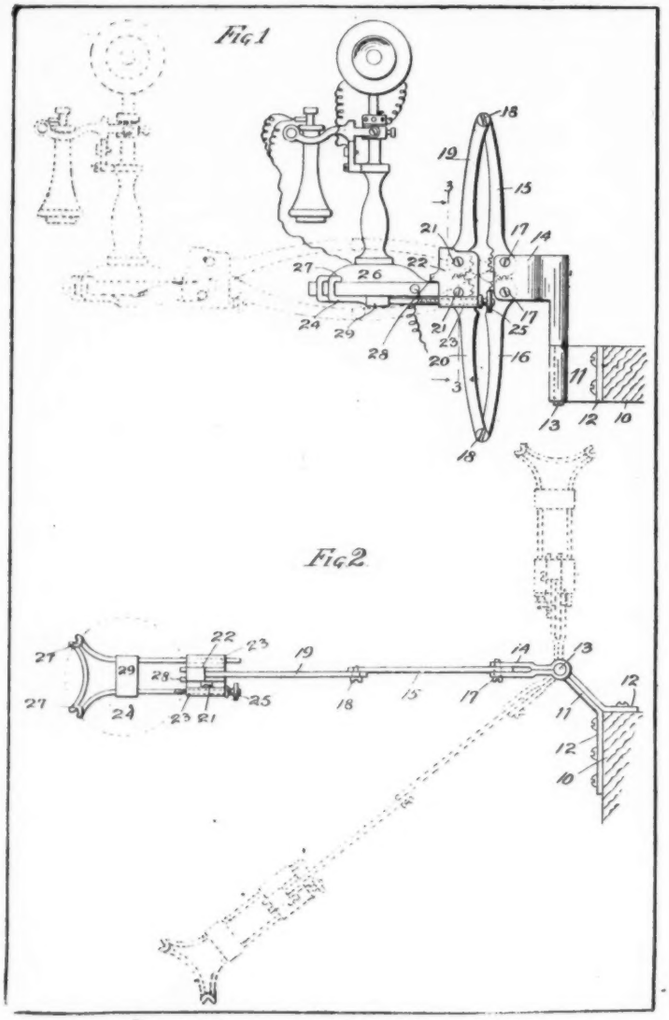


741,285—TELEPHONE SYSTEM.

741,382. S. J. Seifried, folding bracket for telephones.

This device has recently become so familiar to telephone users as hardly to need description. It will be recognized at once. The bracket *11* is screwed on to the desk, and carries a swinging arm *14*, to which are pivoted the double-jointed arms *15-19* and *16-20*, carrying at their outer ends the block *22*, in which slide the extensions of the frame *24*, which has overturned clamps *27*, and a tie-bar *29*. A projection *28* on the block *22*, together with the clamps *27*, serve to hold the base of a desk telephone *26*, the frame being drawn up tight by the nut *25*. The pivoted ends of the arms *15-16*, *19* and *20* are formed with engaging gear teeth, so that uniform extension in a horizontal plane is secured, the entire structure swinging about the pintle of the desk bracket, shown at *13*.

The patent is assigned to The Chicago Writing Machine Company, and there are ten claims, the broadest novelty covered being an extensible bracket embodying two co-

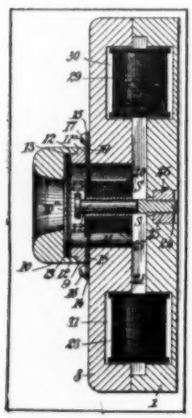


741,382—FOLDING BRACKET FOR TELEPHONES.

operating folding toggles arranged opposite to each other and provided with intermeshing gears at their ends.

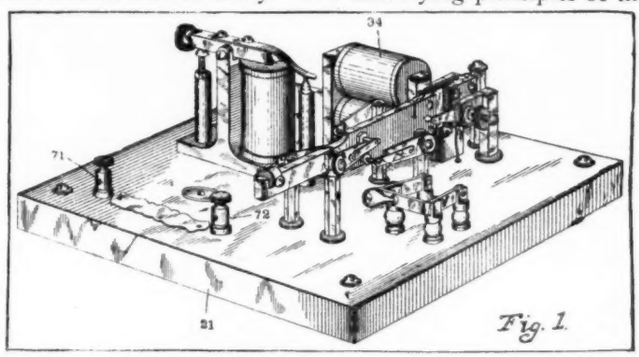
741,604. C. Yeack, combined telephone transmitter and receiver.

This is a magneto telephone that may be used for transmitting or receiving, and for either telephonic or telegraphic work. The casing *1* contains two bar magnets *20-21* having coils *28-29* on their outer ends, and their inner ends in contact with a core *22* carrying the winding *27*. The inner ends of the bar magnets are of the same polarity, being indicated in the figure as south. The core *22* is adjustable, and has in front of it the usual diaphragm *10a*, of magnetic material. Coils *27-28-29* are all in series, and the operation is as follows: Talking to the instrument causes vibrations of the diaphragm, with consequent current in the coil *27*, which circulate in coils *28-29*, which produce changes in magnets *20-21*, which in turn affect the core *27* and thereby the coil *27*, and so on ad infinitum. Receiving with the instrument causes the ordinary operation of a megneto telephone, the coils all acting simultaneously. The specification says: "The currents produced in the several windings should be in phase with each other, and the windings should of course be of proper direction to attain this end rather than to cause the currents to destroy each other." We can only say there seems little to destroy, and we believe the same amount of wire wound on one pole piece or on continguous pole pieces, would give better results. There would be nothing mysterious about this, however, and in mystery there is charm. It is perhaps unnecessary to say the claim of the patent is very specific.



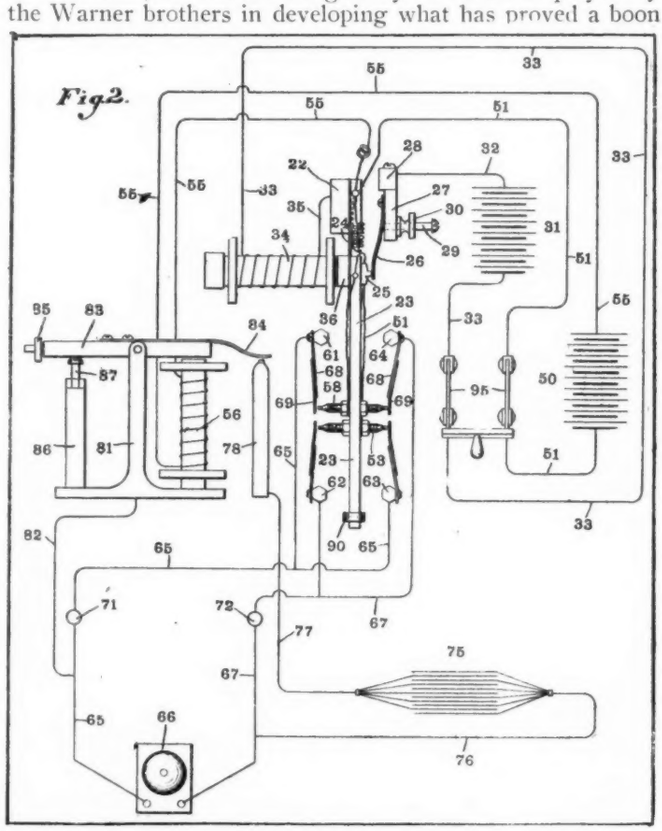
12,162. W. F. Warner, pole-changer, re-issue.

The Warner pole-changer, manufactured by the Warner Electric Company, Muncie Indiana, has become exceedingly well known commercially. The underlying principles of the



12,162—POLE CHANGERS.

device are simple, and have been accepted for a long time. Nevertheless, considerable ingenuity has been displayed by the Warner brothers in developing what has proved a boon



12,162—POLE CHANGER.

to many a small exchange. The original patent was taken out by W. F. Warner, November 5, 1901, No. 685,887. That patent was surrendered and the present re-issue applied for, in order to reform the claims, nine new claims being added.

Referring to figure 1, the apparatus is mounted on a slate base *21*, and comprises the main vibrator, with its magnet *34*, the terminals for ringing and battery circuits, a knife-switch, and a relay of simple design to control the condenser. The connections are as shown in figure 2. The magnet *34* is connected by wire *33* through the switch blade *95* when closed, to the main battery *31*, which is usually a gravity battery, or other closed circuit type, thence by wire *32* to the post *28* and through the spring *26* and contact *25* to the support *24*, and by wire *35* back to the magnet. The arm *23* is kept vibrating by the magnet *34*, making and breaking its circuit at *25-26*. The arm carries a pair of contacts *53-58*, connected by wires *51* and *55* to the battery *50*, which is usually a sal ammoniac or other open-circuit type of battery. This circuit passes through the switch blade *95* and includes the relay *56*. When the ringing circuit is closed the relay is energized.

On opposite sides of the arm are posts *61*, *62*, *63*, *64*—*61* and *63* being connected together and to the post *71*; while *62* and *64* are similarly connected together and to post *72*. These two posts are connected to the ringing busses passing to all the ringing keys at the operator's positions. In the diagram a line *65-67* including a bell *66* is shown connected directly. As the arm *23* vibrates the contacts *53* and *58* swing back and forth against first one pair and then the other of the springs *68-69*. Alterations of current on the posts *71-72* are thus produced. When current is actually flowing in this circuit, due to a ringing key being down, relay *56* connects the condenser *75* across the circuit *65-67* as shown. The patentee says this prevents sparking and also induction or noise in lines adjacent to those signaled over.

Wherever an exchange is too small to warrant the installation of a power plant a pole changer of this type is applicable; and it might be advantageously substituted for a generator wherever the traffic is not too heavy.

COIN CONTROLLED TELEPHONES.

We have received a communication from Mr. G. A. Homan, of Chicago, asking about the Scott Telephone Lock described in our digest in the August number on page 115. The question asked is: What happens when a subscriber who has the lock on his telephone receives a call from another subscriber? Does he have to drop a coin then as well as when he wishes to make a call himself?

We are glad this question has been asked, as our descriptions of these devices have not been in full, and the point has been overlooked. The matter may be of general interest, as the Controller Company of America is developing a good many styles of this type of lock, doubtless with the intention of controlling the market.

In all of these coin-controlled locks the idea is to have a device that can be secured on any telephone close to the switch-hook, so as to lock the latter except when due payment has been made. When a person makes a call, a coin is deposited in the regular way, but when a call has to be answered there are three methods of unlocking the device: First, the user who is entitled to make calls may have "tokens" to use instead of coins, this giving a convenient means of establishing a message rate; second, a key may be furnished by the company to the privileged user, which will unlock the device as well as a coin; third, a magnet may be mounted in the box and operated from central to unlock when desired, without a coin.

All three of these ways have been referred to at different times in our descriptions. The patent above mentioned describes the use of tokens. In our last issue, on pages 294 and 295, we described the magnetic control method. See patents Nos. 739,075 and 739,114.

We should be pleased to receive inquiries of this kind from any of TELEPHONY's readers, and will answer them as fully and as promptly as space permits.

CHEAP TELEPHONES IN SWEDEN.

How would you like a first-class telephone at $1 a month? That is what they have in Stockholm. There are two telephone companies there, one belonging to the government and the other owned by a syndicate of Germans. Neither company charges more than $10 a year per dwelling, and this charge includes a radius of forty miles about Stockholm. It gives you 400 conversations a year and for a few dollars more the service is unlimited. Business houses pay only $25, and some only $20. The government service covers all Sweden. It has 55,000 subscribers, of whom 9,500 are in Stockholm. The German service has 33,000 telephones, and both companies have public pay telephones on almost every street corner.

I like the street telephones. They stand alone on the corners or in the parks looking like sentry boxes walled with glass. Each has slots for small coins and in each is printed the rates for Stockholm and all Sweden. You can have a five-minute talk with any one in Stockholm or within a radius of forty miles outside of it for two and one-half cents, or to any part of Sweden for seven cents.

There are telephones in the restaurants, some of the tables having electric connection. Suppose you are eating there and want to send a message home or to ask a question of some one in another part of the country. All you do is to crook your finger and the waiter brings a telephone to your table and you talk away.

I have a telephone in my room at the hotel, and this is the case with every guest here. The telephone has a switch, so made that by turning it I have connection with the office and bell boy, and so that on reversing I am in connection with the central station, and can bring all Sweden and Norway to my ear at a moment's notice.

The "hello girls" here are government officials, for the government runs the telephones. They are very polite and you don't have to ring more than once. They pronounce the word "hello" as though it were spelt "haloo," with the accent on the last syllable, and they never tell you the line is busy when it is not. At present all the wires in Stockholm are being placed in underground conduits, and altogether the lines are expensively constructed. Notwithstanding this the companies make money and pay dividends at a two and one-half per cent rate.—*Frank G. Carpenter in Chicago Record-Herald.*

TELEPHONE A "DIABOLICAL MACHINE."

Truly extraordinary is a story of the failure of an attempt to establish a telephone system at Saint-Etienne Des Gres, situated in the Tarascon district, France. The necessary apparatus had been packed all ready to start for the village when the carter heard that the inhabitants, being under the odd impression that the invention was the work of the evil one, were determined to oppose its entry, and were resolvd to arm themselves with their agricultural implements and to make a fight of it. The man said that he was willing to confide his cart and its contents to the electricians, but that as for himself he would not risk his life in such an adventure. A telegram was forwarded to Marseilles asking for instructions, and the reply came that the cart was to be left at Tarascon. What the sequel to the present deadlock will be remains to be seen, but meanwhile the good people of Saint-Etienne Des Gres stoutly declare that they will have nothing to do with the telephone, which is "a diabolical machine."

The desperate straits to which the Cumberland (Bell) Telephone Company is put has been shown in Nicholasville, Ky., recently. It has now either gone into the meat business itself or put its local manager in the business.

Detroit Independent Telephone History

FREDERICK A. WEGNER

As the preceding paper treated of the various companies created as a natural outgrowth of the original Harrison Telephone Company, this paper will deal with the companies that were afterward formed—those that were only paper projects and the manifold complications in Detroit.

The service of the Detroit Telephone Company, after the sale to the Bell, grew steadily worse, and a new common-battery equipment of larger capacity was ordered by the Michigan Telephone Company to take over the large number of Detroit Telephone Company subscribers. This created much dissatisfaction among the users of Independent apparatus, not only in Detroit, but also with the Independent companies having toll-line connections with Detroit. December 3, 1901, one hundred and twenty-eight Detroit subscribers, who had been cut off from the old service, held an indignation meeting. They protested against the increase in rates by the Bell company and proposed taking legal steps to obtain satisfaction.

A committee was appointed to visit Corporation Counsel Tarsney and consult with him regarding the rights of the Detroit subscribers and to get his advice as to the proper legal steps to take.

Mr. Tarsney was unable to give the committee much satisfaction. The legality of the increase in telephone rentals and the question as to whether or not the company was subject to regulation required considerable deliberation before a legal opinion could be rendered. The question as to whether the ordinance giving the use of the city's streets to the Michigan company granted the city any rights in the matter of rates was an open one.

It was to be a citizens' crusade against the older company, the proposition being to secure the names of all Michigan company subscribers to Detroit company contracts. It was held that the Detroit company could be compelled to carry out all its franchise obligations. To be successful it was necessary to secure the co-operation of subscribers of the Bell company, and to that end subscribers to the Michigan service were requested to order out their Michigan telephones and subscribe for Detroit instruments. It was believed such a demand could not be ignored, because the company would be compelled to surrender its franchise if it refused service.

A Mr. Holton, who had two Detroit telephones in his store, took the initiative in urging citizens with Michigan telephones to request a change, pointing out that by such a move the Bell company would be checkmated in attempting to increase its rates.

Mr. Holton consulted attorneys on the question of whether the Michigan company could not be compelled to restore its connections under the assumed contract he held. The contracts were in the regular form of receipts, showing that rentals were paid up to the first of the year. He took the position that he would not have paid in advance had he not believed the company would continue to furnish him the same service it had already given him. The fact that his name was in the Michigan company's directory, together with the printed announcement of the Michigan company at the time it absorbed the Detroit company that it would give connections to subscribers of both lines, was looked upon by Mr. Holton as proof that a contract existed that the Michigan company was in duty bound to carry out.

And by Michigan subscribers demanding that Detroit telephones be substituted, Mr. Holton argued that citizens might make the system practically one line and obtain service at the $40 and $25 rates, upon which the franchise of the Detroit company was based.

Mr. Holton stated that after he had refused to permit a pay station to be established in his store the Michigan company threatened to remove his name from the directory, but the company afterward backed down when he threatened a suit.

A committee was appointed to advise with the corporation counsel, with instructions to report and, if possible, make recommendations at a meeting of Detroit subscribers to be held in the office of John Mahan.

There was to be framed at that meeting an appeal to Michigan subscribers to aid the movement against the amalgamated concern by demanding that their Michigan telephones be taken out and Detroit telephones substituted.

Another meeting was held in the store of Wm. D. Southworth, and Michigan telephone subscribers as well as those who had Detroit telephones were invited to be present.

At a subsequent meeting of this association J. H. Pound delivered an address advising immediate legal action. It was decided to leave the manner of taking action with the executive committee, of which Mr. Holton was a member, and who importuned Mayor Maybury to call an indignation meeting. The mayor naturally advised slower action.

A plan was devised to have the subscribers of the Michigan company bind themselves by contract to keep their telephones, after the commencement of the new quarter (when the new rates were to take effect), and after the ending of the same to tender payment at the old subscription rates, and, if the company threatened or attempted to take out the instruments, to prevent them by injunction, and by this means bring the matter into court.

It was hoped that between 2,000 and 3,000 subscribers would enter into an agreement of this kind and thereby make the pressure so great that it would compel the Bell company to desist in its efforts to raise rates. All these efforts, however, went for naught.

Attorney Flowers was to represent the Detroit Telephone Construction Company in the suit brought by Attorney Pound to compel the Michigan Telephone Company to give the Detroit company's subscribers their old service. The Detroit Telephone Company and the Detroit Switchboard Construction Company were made respondents to the bill for mandamus. It was not known who represented the Michigan company, as some time previous it had established the offices of its attorneys in Minneapolis and had only a claim attorney in Detroit.

August, 1902, the Michigan Bell company had defaulted over an entire year on its bond interest, and the holders thereof were becoming anxious.

The telephone cloud was to have a silver lining by reason of the Bell company's foreclosure sale, which was to cut off the incubus and dispose of the Detroit franchise. There had been some talk about foreclosure proceedings, but a very important point had been overlooked, which was well understood by those on the inside, as it was no less a matter than the franchise of the Detroit company.

The Wayne circuit court had decided that the Michigan company on demand was bound to furnish Detroit telephone subscribers a service at the rates provided for by that company's franchise.

The Detroit company's plant, however, had been previously absorbed and dismantled, and but few subscribers still insisted on keeping their contracts at the old prices—$25 and $36 a year.

Judge Carpenter's decision had been appealed to the supreme court and various attorneys said it would undoubtedly be affirmed. The Michigan Telephone Company would then be placed in a very unpleasant position. It would be obliged to come down to the old rates, for everybody would demand a Detroit telephone and the Michigan company would have to furnish a service at a rate of $24 and $36 per year.

The important point to be gained by the foreclosure proceedings was to squeeze out all the water in the $5,000,000 Michigan telephone stock, and about $500,000 of "guaranteed" Detroit telephone bonds. The Michigan company would then be able to finally unload the Detroit telephone franchise.

The Michigan telephone bondholders, holding first mortgage, would bid in the physical property of the old Michigan company at a price just sufficient to secure themselves, and they would then reorganize under the Michigan law, providing for the organization of telephone companies, which is so broad and so well supported by supreme court decisions that no franchise is needed. As a matter of fact, the Michigan Telephone Company has no franchise, and it has always contended that a franchise was entirely unnecessary.

Under Michigan law a telephone company can plant its poles and string its wires along any highway or public place, or under any public waters, the only condition being that it must not interfere with or injure existing lines. If a citizen's trees extend their branches over the line of the public highway or street the company can cut the branches off in order to string its wires.

The importance of getting rid of the Detroit telephone franchise was evident. If the mortgage was made after the purchase of the Detroit Telephone Company and covered its plant, it would not be possible to get rid of the franchise. But if it was made before the Detroit telephone deal, then the guaranty of the Detroit telephone bonds would be wiped out with the decrease of the corporation giving the guaranty.

In the opinion of good lawyers, as well as that of brokers and financial men along Griswold street, who had made a study of such things, the old Detroit franchise was as good as killed, and immediately after the foreclosure and sale of the Michigan Telephone Company it could charge what it pleased for the use of telephones.

August 7, 1902, Richard Dana of Boston had been elected to look after the Detroit Telephone Company bonds. A receiver friendly to the Michigan company's interests was to be appointed, and very naturally the Detroit company investors became anxious.

A dispatch from Boston said that it had been decided to have a friendly receiver for the Michigan Telephone Company. The protective committee formed in Boston now had nearly all the bonds on which the interest was unpaid. In Detroit there was a feeling of certainty that the receiver would be the Union Trust Company, and that the Michigan Telephone Company would get rid of the Detroit Telephone Company's low-rate franchise, which now seemed certain the courts would enforce. There was also talk that when the Michigan Telephone Company was relieved of the possibility of these low rates, and be able to charge what it pleased, that it would broaden out its policy by making working arrangements with the Independent companies throughout the state. A director of the People's Telephone Company, whose plant did not appear to be any nearer completion than when Everett & Moore failed, saw in the reorganization of the Michigan Telephone Company a favorable opportunity to keep the People's company and possibly unite the two.

In the meantime the bondholders of the Detroit Telephone Company, which had been absorbed and put out of business by the Michigan Telephone Company, were exceedingly anxious to know what would become of their holdings. A Detroit broker who had sold Detroit Telephone Company bonds and who earnestly desired to protect his customers said that the interests looking out for the Michigan Telephone Company bondholders "don't care a rap for the Detroit Telephone Company bondholders." It appeared that it was up to them to look out for themselves.

This broker received a letter from Jose, Parker & Co., bankers, Boston, Mass., who represented the owners of $119,100 of the first mortgage bonds of the Detroit Telephone Company, who recommended having the Detroit Telephone Company bonds deposited in the Central Trust Company, New York, trustee under the mortgage, and it was also recommended that a bondholders' committee of three people be appointed to draw up an agreement of deposit to handle the matter in the interest of the holders of the Detroit Telephone Company bonds, and the retention of Ropes, Gray & Gorham, attorneys in Boston, as counsel for the committee. The letter concluded as follows:

"As the Michigan Telephone Company bondholders' committee are Boston men, with Boston counsel, Messrs. Storey, Thorndike, Palmer & Thayer, we would suggest Hon. Richard H. Dana of Boston, a bondholder, for one member of the committee, and one of our firm as the second member, and these two to choose a third."

The Detroit broker acceded to these recommendations, and it may therefore be concluded that Richard H. Dana was looking after the interests of the Detroit Telephone Company bondholders. It was also thought likely that a receiver would be asked for the Detroit Telephone Company.

A Detroit broker wrote to the Boston bankers, Jose, Parker & Co., to learn what courses were open to the owners of the Detroit Telephone Company bonds, now that they were in the hands of the Central Trust Company, with a committee headed by Richard H. Dana to protect them. Jose, Parker & Co. replied that there were three courses open to negotiation, as follows:

1. To obtain the guarantee as to principal and interest on these Detroit telephone bonds of the Western Telegraph and Telephone Company which practically owns the Michigan company, anyway, and the other four companies of the Erie.
2. To co-operate with the Michigan telephone bondholders' committee and secure for the Detroit bonds the same terms as they secure for the Michigan bonds.
3. Foreclosure of the Detroit bonds.

There may be other things that can be done, but without conferring with counsel these seem to us to be the three methods of procedure and the method adopted will be regulated largely by a legal investigation of the deed of trust and Michigan laws, coupled with a business investigation of past business.

As the Western Telegraph and Telephone Company is declaring a dividend and the Michigan Telephone Company is the only subsidiary company reported in financial trouble, the bondholders, many of them, put a finger at the side of the nose and wink mysteriously. The most they say regarding their suspicion is: It looks queer.

On Thursday, January 9, 1902, there was a meeting of the committee on the telephone situation, and the next day, as a result of its report, there were at least two exceedingly vexed individuals.

Charles Flowers was one of these persons. He took umbrage at the statement that the Detroit Telephone Company was organized by five men who put in $1,200 each, and finally divided up a million dollars. On an investment of so small a sum of money, if they were such clever financiers and actually made that profit, they certainly were entitled to it, but there was at least $60,000 spent in construction work alone on the Detroit exchange.

Mr. Flowers would not say how much money had been put into the Detroit Telephone Company or how much was taken out. But he picked up a pen and made figures on a sheet of paper. The first figure was $500,000. He looked at this a moment, as though it represented a good story, and said it represented the amount of stock issued.

Then he put down $251,000. "This is the controlling interest held by thirteen persons," he said, and it having been sold for fifty cents on the dollar, Mr. Flowers divided it

by two and got the result—$126,000. Then he carried along the problem by saying there was just the difference between the truth and the M. & M. report that there was between $126,000 and $1,000,000.

Mr. Flowers was invited to discuss the five-men phase of the Detroit Telephone Company division of the report, but he shook his head.

Joseph W. Martin, secretary of the People's Telephone Company, was the other individual who took exception to the report. Mr. Martin had heard that Chairman Hamilton Carhartt of the M. & M. committee had said things about him and his business.

There was a report from New York on January 10, 1903, that a settlement had been arranged and foreclosure proceedings stopped in the suit begun in the United States court in the Detroit circuit to foreclose the mortgage held by the Central Trust Company of New York to secure the $600,000 bond issue of the old Detroit Telephone Company. The report was not credited, however, but was interesting news in Detroit.

After default was made in the interest payment on Michigan Telephone Company bonds, foreclosure proceedings were started in Detroit by the Old Colony Trust Company of Boston, the trustee of the bonds, through the law firm of Dickinson, Stevenson, Cullen, Warren & Butzel. Subsequently the Central Trust Company instituted its suit, and at the same time filed a petition to intervene in the suit begun by the Old Colony Trust Company. Mr. Dickinson stated then that a settlement was not only news to him, but that it was highly improbable.

"My instructions are to push the suit," said Mr. Dickinson, "and, in fact, F. W. Stevens, solicitor for the Central Trust Company, and myself expect to go over to the United States court to-day and arrange a date for the hearing."

Mr. Stevens also stated that he had heard absolutely nothing about any settlement. A gentleman also interested in the telephone business in Detroit stated that if this reported discontinuance of the foreclosure proceedings was true, it meant that steps had been taken for a reorganization of the Michigan Telephone Company.

ORGANIZATION OF THE PEOPLE'S TELEPHONE COMPANY.

Joseph W. Martin, a promoter of sugar beet and cement companies, having through business deals become acquainted with the president of the Detroit Telephone Company, helped organize several Independent companies for the New State Telephone Company by reason of this connection, and obtained a good insight into the telephone situation. He made a trip to New Orleans to become manager of the exchange there, but his stay was only of three days' duration, because of business reasons, and not, as he claims, because of his motherless children. He injured both the People's company, which he organized, and also the Co-Operative Telephone Company, in which he also had an interest.

After the sale of the entire Independent system to the Michigan Telephone Company there appeared to be a good opening for a further profitable investment of capital in telephone enterprises in Detroit, and Mr. Martin straightway set about securing a franchise for an Independent system.

The People's Telephone Company was organized in 1900, and its board of directors was composed of Theodore D. Buhl, John B. Corliss, Henry A. Everett, Edward W. Moore, J. C. Hutchins, Alex. McPherson, Arthur W. Pack, Chas. L. Palms and Henry W. Stephens. The officers were: Arthur Pack, president; Alex. McPherson, vice-president; Geo. L. McPherson, treasurer; Joseph W. Martin, secretary; Joseph B. Ware, general manager.

April, 1901, this company purchased an exchange site, where it was proposed to construct a six-story steel and brick building for its exchange. It proposed having only one large exchange, so as to facilitate speed in giving service. Up to October the company had a gang of 600 men constantly at work upon its underground system and had over 876,000 duct feet of conduit laid; also over 2,900 poles had been set. With reference to its poles, as with everything else, they were of the very best quality, every one straight, well painted, and even in the outskirts of the city no small poles were used; in fact, the construction work was a marvel of excellence, due largely to the engineering skill of Arthur W. Hoge of the Ideal Construction Company, Lima, Ohio, who was construction superintendent.

Even the city officials praised the company, for the street pavements were never put back in such good shape by any corporation before. In cases where it was necessary to lay conduits within the curb new sod was used in restoring the lawns. These are pointers that other construction companies can make use of with an absolute certainty of profit to themselves.

It was publicly given out on April 10 that the company had closed the contract with a well-known Chicago firm for what was to be the largest switchboard in the United States, and 6,000 instruments were also a part of the contract. The total price to aggregate $196,000. The switchboard was to be of an initial capacity of 6,000 lines, with an ultimate capacity of 12,000.

EVERETT-MOORE SYNDICATE TROUBLE.

Up to the beginning of the year (1902) everything was running along nicely, when suddenly, with the unexpectedness of a thunder-clap in a clear sky, there was the announcement of financial trouble of the syndicate that was behind the People's company. The Everett-Moore syndicate was financially embarrassed.

Several of Detroit's most prominent bankers stated that they had not had the slightest inkling of danger. The Detroit Trust Company, trustee for many of the bonds, said it had no thought of trouble, and Michael Brennan, attorney for the Detroit United Railway, said he hadn't heard even the remotest whisper of trouble.

The Everett-Moore syndicate embarrassment was the greatest sensation Griswold street (Detroit's Wall street) had had in many days. As the news became disseminated leading operators swarmed the various Griswold street meeting places and eagerly discussed affairs, and scores of telegrams were sent to Cleveland asking for additional information.

Leading bankers and financial men expressed opinions to the effect that "it looked as though Everett-Moore had borrowed too much money and were obliged to go into the hands of a receiver." Wild rumors prevailed that this or that operator who was known to have big interests in suburban bonds had been unable to meet his obligations.

A generally expressed opinion was that for some time to come suburban electric investments would have a black eye. This was true, especially of Everett-Moore securities, and while local suburban bonds were all right, so far as their face value went, they were not easily marketed.

One of Detroit's heaviest operators in Amalgamated copper was Frank C. Andrews, who found himself in rather an awkward position. When the market began to drop he ceased buying on margins and "took out" all he could; that is, instead of distributing his money to "keep good," he bought outright all the "Amalgamated" he could swing, depositing the stock from time to time with an Eastern banking house as an additional security on certain suburban bonds that he was using to raise money. He was in a position where, if the public became doubtful of the bonds, and it did, or the guaranty was not all that it seemed on its face, the banks would naturally take the "Amalgamated" stock to secure money advanced, and he found himself with empty hands so far as this particular security was concerned.

There were $4,000,000 worth of bonds held in Detroit, divided among the various suburban lines, which unloaded

on Everett-Moore and took a guaranty of interest account from the Detroit United Railway.

The nature of the guaranty which secured the bonds was as follows:

"In consideration of the conveyance to be made to it of the property covered by the mortgage referred to in the within bond, the Detroit United Railway hereby guarantees and assumes the punctual payment of the principal and interest of the within bond at the time and in the manner specified therein, and in said mortgage, and covenants to pay the said principal and interest as the same shall become due in accordance with the provisions of said bond and mortgage."

The above guaranty was said to insure the integrity of the bonds, and in effect it was equivalent to an indorsement on the back of a note. The underlying value of the roads themselves was security to the bondholders, but the Detroit United came forward and guaranteed the interest account, leaving the Everett-Moore nothing to do with the matter.

All of this so materially interfered with the plans of the syndicate in carrying out its plans of constructing a first-class telephone system in Detroit that to-day, with its miles of excellent conduit system, with over 7,000 poles set, having expended, it is claimed, something like $400,000 in actual cash, the People's Telephone Company has gone no further with the project than when it was forced to stop because of the embarrassment of Everett-Moore.

BELL COMPANY BLAMED.

A very interesting feature of the complication was that the Bell company was blamed for the Everett-Moore syndicate's troubles, in that it was said to have "queered" the sale of Federal telephone bonds, of which the People's company was a part. The syndicate had organized a formidable opposition in Ohio, in the interior of Michigan and in Detroit, for which they incurred the enmity of the Bell officials.

When the syndicate first entered the telephone field it was with a view to building up an immense system, which would be wholly independent of Bell control. Contracts for long-distance service were made with the distinct understanding that the syndicate *was never to sell out to the opposition,* and in a number of cities franchises were granted almost wholly with that understanding.

In its traction business it had been the practice of the syndicate to finance its propositions before they were completed, but unfortunately in the building of Independent telephone systems this was not carried out, for the reason that telephone properties when completed commence to yield quick returns, and it was thought that the debts could be taken care of very largely out of the earnings.

Shortly before the Federal Telephone Company attempted to dispose of large blocks of its securities with Eastern bankers, which had been successfully accomplished previously with traction securities. It was found, however, that there was an underlying opposition among Eastern financiers, the true meaning of which finally became apparent when the American Bell Company made a proposition amounting almost to a demand that the Federal company sell out its interests. It was stated that the Bell people offered to permit the syndicate to remain nominally in ownership of the telephone properties; the Bell company to take up the securities of the Federal company at a profitable figure, *besides giving the heads of the syndicate a million dollars for withdrawing from the field.*

With a determination to carry out its agreements with the Independent companies and the public in general, the syndicate refused to accept any proposition which would tend to cripple the Independent situation. The result of this refusal was a declaration of war made by the Bell company, and a refusal of Eastern bond buyers to take the Independent securities.

OTHER RUMORS.

A number of rumors as to the cause of the failure were circulated, among which was that the New York Central was to blame, as the syndicate had attempted to parallel the Lake Shore with an electric line from Cleveland to Toledo, and in that way had aroused the enmity of the New York Central.

It was said that when the People's company was organized Everett-Moore took seventy per cent of the stock, together with a like amount of the bonds, which went with the stock. Only $70,000 of the stock was placed in Detroit. The stock was issued as subscribed for in the form of certificates, calling for the stock when paid for on assessments, and the latter were made from time to time as money was required.

Up to the date of their temporary inability to meet their obligations, which was extended by a bankers' committee from thirty banks for eighteen months, there had been only three assessments of ten per cent each, and it was said then that work on the Detroit plant languished because Everett-Moore had not paid their last assessment. It was not known then or now whether the control of the People's company was in the hands of Everett-Moore or the Federal Telephone Company, as Everett-Moore had sold a large amount of their certificates in New England, and it was thought that control had passed out of their hands.

It was the plan to have Everett-Moore turn over what certificates they still held to the Federal company, which had been assigned to the Cleveland banking syndicate.

Another story was to the effect that Everett-Moore were very ambitious and had a desire to absorb the Erie Telephone Company, which had $10,000,000 outstanding bonds and $10,000,000 stock, and obligations of a miscellaneous character running into the millions. They had bought Erie heavily before that stock declined in value.

ELECTRIC RAILWAY CONNECTIONS.

The United Railway was the largest single property within the syndicate's control and the greatest revenue producer. It had been used as a guaranteeing constituent and under ordinary circumstances its support would have been sufficient to establish necessary credit. But every time this matter came up for examination the endurance of the franchise of this company and the attitude of the people toward a renewal caused a discussion, and even the showing of the great earnings of the road were insufficient to overcome the obstacle in the form of the comparatively short life of the franchise.

There can be no doubt that Everett-Moore would have sacrificed much to have secured an extension of their rights in the streets of Detroit, but the agitation which necessarily would have resulted from any attempt to secure extensions would probably have had a disastrous effect on their plans of raising money, which was promising up to ten days before their embarrassment. It certainly appeared as though Detroit had supplied the key to the trouble.

About July 1, 1903, which was the end of the period for extension, it was thought there would be an application for a new franchise, as it was then likely that a franchise extension would become, if not all important, at least a necessary factor in settling the difficulties of the syndicate.

If the franchises of the Detroit United Railway had been extended the Everett-Moore syndicate would have had millions at their command with which to finance their telephone schemes.

The electric railway combination alone was a big enough deal to satisfy any ordinary ambition. Its details and financial demands were sufficient to occupy the attention of one set of managers until it was completed, but it was not enough to satisfy Everett-Moore. Their experience with an Independent telephone exchange in Cleveland made them optimistic, and they wanted to branch out in that field also and cut still deeper into the Erie company's business.

In Detroit they saw the company which was part of the Erie system *loaded with debt from having absorbed a rival.* They saw a high rate gradually forcing itself upon the com-

pany and its subscribers, and here appeared to be a fine opportunity to cut in with an Independent company that would not be handicapped with any debt except the expense of installation. It could force the old company to either buy or sell, if it could get a secure footing, and ultimately it might be able to cut out all the Michigan business of the Erie company.

This alone was an undertaking involving an investment of millions. Its rival was strongly intrenched, with a heavy investment of capital and with all kinds of financial and political backing. Everett-Moore evidently expected to work the same system in the telephone extension that seemed so sure of results in the electrical railway syndicate, and use the telephone stocks in their control as collateral for the new extension as far as they would go.

In self-defense the telephone opposition began to fight and the stocks declined. Everett-Moore found people beginning to question their backing and to doubt their resources for carrying through two such deals simultaneously. The more financiers thought about the matter the more they doubted the syndicate's ability to carry through successfully the undertaking, and when confidence became shaky Everett-Moore came to a halt.

The Everett-Moore syndicate owned or controlled many trolley and telephone lines throughout Ohio and Michigan. Among the telephone properties were the United States Long-Distance Telephone Company, Cuyahoga Telephone Company of Cleveland, the Stark County Telephone Company, the People's Telephone Company of Detroit and many others, including the Federal company of Cleveland, in which they also had large holdings.

When Everett-Moore became aware that many of their liabilities were becoming due about January 1, 1902, and could not be met, they called together some of their personal advisers to confer with them as to what had best be done. These gentlemen examined very fully into all of the affairs of those composing the syndicate and were furnished with very full and complete information.

They found in their investigations that in the telephone situation, while among its different elements it had many companies that had fully completed their equipment and were on a paying basis, that there were others that needed financial assistance.

The bankers' committee said that the personal equities of the syndicate members were largely in excess of their liabilities and that, in their judgment, all of the personal creditors could be paid, without doubt, from the assets and several hundred thousand dollars put into the completing of the properties.

The thirty banks that were their creditors in Cleveland held the choicest of the securities and most of the equities.

As far as the situation was concerned at that time, it was necessary to arrange for time in which to meet the $1,500,000 of construction and material claims against the Federal company. This was, as before stated, satisfactorily arranged by giving the syndicate eighteen months in which to meet its obligations, and which they practically did inside of twelve months.

The various stocks this syndicate had and were compelled to let go at low figures afterward sold high enough to have enabled them to clear nearly $3,000,000, if their crash had held off a few weeks.

The total capitalization of all their traction and telephone properties represented $130,000,000, of which they held over half, in order to give them control.

ORGANIZATION OF CO-OPERATIVE COMPANY.

The financial troubles and the practical failure of the People's company induced another company to organize what was known as the Co-Operative Telephone Company. Public Lighting Commissioner Frederick F. Ingram was the prime mover; Jasper C. Gates was employed as attorney; Hamilton Carhartt and Clarence M. Burton and J. Ward Rowland were directors.

Its ownership and control was to be permanently invested in its telephone subscribers, and the service to them was to be at cost and the control not be alienated except by city ownership. Price of stock was to be $50 a share. The whole amount was not to be collectable at once, but was to be paid in small installments. The promoters agreed to advance all the money needed for the immediate wants of the company.

From the 12,000 subscribers of the Bell company it was hoped to secure the first support, and among them their first missionary work was done. It was expected that the small charge made for one share of stock each subscriber was expected to take would deter no one who rented a telephone from taking part in the enterprise. The low rate to be charged would enable each to save money thus invested, and any subscriber wishing to give up the service, it was thought, would have no difficulty in disposing of his one share of stock. It was expected that the affairs of the company would be administered further by trustees, and such safeguards were to be provided that it would be impossible for any coterie of men to impair the interests of the subscribers.

It was predicted that the outcome of the organization of the Co-Operative company couldn't be anything else but disastrous to the existing concern, and that *ruin would come most speedily to the People's company.* There would be no incentive for the Everett-Moore syndicate or its successor to complete the plant. The partly finished system would be worth little to its owners, except as junk, as they would be *ready to sell at any price* and *lucky to get even a fraction of what they spent.*

The interests of the Co-Operative telephone movement were rapidly pushed in the beginning by Jasper C. Gates and associates, who had thirty clerks addressing envelopes to the people of Detroit, asking them their opinion on the telephone situation. Ten thousand letters were sent to as many different telephone subscribers, all names having been copied from the Michigan company's telephone directory. Of 396 people who returned postal card answers to these circular letters, only four expressed themselves dissatisfied with the co-operative plan. Thirty were on the fence and 355 indorsed the movement. Of the 355 a large percentage offered to take stock.

Many of the writers of the postal cards signified their disapproval of the Michigan company's method by repeating the word "No" several times in the blank spaces left for the answer to the question as to whether they liked present conditions, and there were many trite expressions of approval of the plan.

It was decided that it should be part of the agreement on the certificates of stock that in the event of any stockholder wanting his interest to go to a non-subscriber, he could have his certificate canceled and a *bond* issued to the non-subscriber entitling the latter to participate in the dividends, but not in the control of the company, as he would have no vote.

Another feature was that ten per cent of the stockholders could at any time, by petition, call a meeting to arrange for an election, in order to make changes on the board of directors, and that quarterly dividends would fall due simultaneously with the telephone rentals, so that the former could be deducted when the latter was collected.

To sign a contract agreeing to take a residence telephone wouldn't cost anything; that is, the subscriber would not have to buy stock, but a telephone went with every share of stock sold. If a man wanted fifty shares of stock he would have to pay the rental price of fifty telephones. This, however, was so arranged that it would not deter any one from investing all he pleased in the company, because common bonds would be sold and those were to earn dividends the

same as stock. So if a man wished to put a couple of hundred dollars into the enterprise, though he had no use for more than one telephone, he could buy one share of stock and three bonds. This would give him the amount of earnings he would receive on four shares of stock, but he would have only one vote.

This plan was also intended to prevent any person or set of persons, less than a majority, from obtaining control of the company, which is always a safe provision in any enterprise.

Mayor Maybury favored the co-operative plant, on certain conditions, and was heartily in favor of the movement. He believed it should be under municipal regulations. Regarding the proposed purchase of the incomplete plant of the People's, Mr. Maybury wanted a written proposition to cover all the interests of stock and bondholders, as well as those of the company and contractors having in charge the construction of the local plant. If the People's company proposed to go on and complete its plant and operate it, the mayor did not consider it a wise move to establish a co-operative system. In this event he would insist upon the telephone people putting up a satisfactory bond for $100,000 to insure the carrying out of their plans.

In the co-operative system the mayor stated that the bonds issued should all be taken care of by a committee of twenty-five citizens and individual subscribers, acting voluntarily. He also advocated that the common council pass an ordinance fully regulating the use of the telephones by subscribers. It was also considered at the time of organization that if one man owned one share or one hundred shares of stock that he was to have only one vote in the stockholders' meetings, and no person was to be allowed to hold stock unless he was a telephone subscriber.

The stock of the company was to be held in trust at the city hall or be placed in the hands of some responsible trust company, and transfers from one person to another would have to be made at the office where the stock was held. After the stock was subscribed for, then the necessary amount of bonds was to be floated with which to install the exchange.

Under the co-operative plan the price of telephones was to be $24 and $40 per year, and it was argued that dividends on stock held by each subscriber would bring this amount down to bare cost. At the start the capital stock of the company was to be $250,000, in shares of $50 each.

One week's canvass resulted in securing of $40,000 worth of contracts and bonds for the co-operative plant. A bond of $25,000 was filed with the city clerk for the faithful performance of the company's obligation to put the streets they tore up in as good condition as when they first entered upon them. It was signed by C. M. Burton and J. Ward Rowland, respectively president and secretary of the company. The bond was referred to the corporation counsel for an opinion as to its value.

How various men think upon the same subjects is herewith illustrated. The retail grocers and butchers met in a local hall to discuss the telephone situation and adopted favorable resolutions and pledged themselves to co-operate. The trades council delegates were favorable to municipal ownership of telephones, but sat down hard on a resolution indorsing the proposed Co-Operative Telephone Company. They believed that it would develop into a money-making institution for its originators.

The common council committee on franchises considered the application of the Co-Operative Telephone Company for a franchise. Charles Flowers, representing the Michigan Telephone Company, opposed the granting of the franchise, particularly objecting to the plan for the co-operative company to use the public lighting conduits for stringing telephone cables and wires. After the committee had decided to report the co-operative company's ordinance for first and second readings, Mr. Flowers suggested that the aldermen offer the franchise for sale to the highest bidder, the same as was proposed to do with the steam and hot water heating franchises. Two of the aldermen seemed to consider the suggestion favorably. One alderman considered it unfair for the council to grant a franchise to the co-operative company until it was learned whether the People's company or its successors intended to complete its plant, while another was of a contrary opinion.

The Michigan company circulated petitions against the issuance of any franchise to the Co-Operative Telephone Company, but the managers of the co-operative didn't care, as they had the mayor and common council with them.

A plan to finance the co-operative company's proposition was discussed at a meeting of the directors, to buy the underground construction from the People's company, paying for it in appraised valuation in common bonds, bearing five per cent interest. As this would have been practically the same as stock, it probably explains why, at another meeting, the directors voted to *amend* their plan so as to allow *one person to hold any amount of stock.*

MERGING OF PEOPLE'S AND CO-OPERATIVE COMPANIES URGED.

Both companies being in bad financial straits, it was deemed advisable to consolidate the interests, if it could be brought about. Several attempts were made to do this, but the effort was abandoned for various causes.

The principal reason for merging the two companies was that both found it impossible to get the necessary money with which to complete their plants. Consolidation was not sufficient. The new merger franchise found it necessary to evade the objectionable features of the old franchises. It was necessary to establish satisfactory rates and conditions, so that subscribers and others would feel safe in investing their money. Among the objectionable features claimed by those desiring the merger was that the franchise of the co-operative company did not permit the company's rights and its plant to be sold to another company, as the common council would have to be asked for permission. The right of purchase at any time by the municipality was another provision that seemed to stand in the way of people putting money into the project.

All these so-called objectionable features were to be avoided by the new franchise, the rates were to be raised so they would give certain returns on the money invested and provide for such public supervision of the business that the city would always know whether or not the rates were as low as they could be made, and also pay eight per cent on the actual capital invested.

After considerable oral sparring between the three rival interests, it was finally decided by the committee to recommend that the residence rate be $36 a year, net, without reference to the size of the exchange, and that the business rate be $48.60, net, when the exchange had 6,000 telephones, with a gradual increase in price as the exchange grew larger. As first drafted, the ordinance also provided for a graded scale for residence telephones, but the committee would not agree to it.

The committee of citizens who were asking the common council for a merger franchise was composed of the following gentlemen: Ralph Phelps, Jr., Bethune Duffield, James E. Scripps, James B. McKay, Thomas G. Craig, D. C. Delameter, Joseph Harris and W. H. Ellis.

There was another provision, in addition to the one that the city might purchase the plant after the expiration of ten years, to the effect that, should the company operating under the merger franchise have an opportunity to sell out to its local rival, the city was to be given first opportunity to purchase, with a two years' option. Neither company was to surrender its franchise until the consolidation was completed.

Some of the remarkable changes in opinion and of mind as exhibited by the common council and the mayor are herewith illustrated. Many of the aldermen, in the beginning of the agitation for a merger franchise, looked with suspicion upon it when it was favored by the mayor, and ex-

pressed the belief that it was engineered simply for the purpose of relieving those who had lost their money.

Mayor Maybury called a special meeting for the purpose of considering the telephone situation, and in his message set forth the reason for calling the meeting, intimating that a new telephone ordinance might be applied for.

The message follows:

To the Honorable the Common Council: *Gentlemen*—I herewith transmit to your honorable body certain papers placed in my hands, and which relate to options given by the People's Telephone Company and the Cooperative Telephone Company, respectively, to a committee of ten citizens of Detroit. It appears that on the suggestion of the citizens referred to, these options were put in writing, and it is the purpose of said citizens' committee to counsel with a special committee of your honorable body as to the most favorable means under which the options submitted can be made effective, *and one Independent company be created* and thoroughly equipped for the benefit of our people, and to be controlled if possible by local capital and representation. I believe the subject matter to be one well worthy of your prompt and very careful consideration, to the end that such action may be taken as will confer the greatest public benefit. The time for completing the work under the charter granted the People's Telephone Company expires October 7 ensuing (1903), and it is now plainly evident that the work can not be completed within the time allowed. The Cooperative Telephone Company has made good progress in the matter of completing its organization. Both of these companies, therefore, *have assets which are available and which may be combined in an Independent company*, and their cash value prove effective to the *new company* in carrying out its purposes. I would respectfully recommend that this communication and accompanying papers be referred to the special committee of your honorable body heretofore appointed, with the corporation counsel, to consider the telephone situation, or to such other committee as may seem to you proper in the premises. Respectfully submitted, WILLIAM C. MAYBURY, *Mayor.*

This communication, together with the options, were received and referred to the special committee appointed months ago. No hasty action was to be taken.

It was the intention of the committee to handle the proposition carefully and give every one a fair show, as the members were under no particular obligations to either company.

At a very lively meeting of the common council, by a vote of twenty-five to four, it passed the merger ordinance, with the provision that a charge of $1.50 a year, in addition to the $54 business rate, might be charged for each 1,000 telephones in excess of 6,000. Over this provision the principal fight was waged, and it was retained by a close vote of fifteen to fourteen. The maximum residence telephone rate was placed at $40 a year.

THE MAYOR SURPRISED.

When Mayor Maybury learned that the ordinance had been passed he *seemed surprised,* and particularly when he was told that the vote was twenty-five to four. He said experience had taught him to carefully consider such matters; that it was much easier to pass than change or recall ordinances. While the ordinance ran to the six gentlemen composing the citizens' committee, it was intimated by Joseph W. Martin that Henry A. Everett, the Cleveland capitalist and promoter, and his associates expected to get the franchise. Of the original ten then composing the citizens' committee, four had withdrawn.

One of the aldermen at the meeting moved to amend the merger ordinance so as to prevent public lighting wires being laid in telephone conduits, on the ground that they would interfere with the telephone wires, and it was adopted. Another alderman moved to amend the ordinance so as to authorize the raising of telephone rates $1.50 per year for each 1,000 subscribers in excess of 6,000 subscribers of all kinds, instead of having the proposed additional rental apply only to business telephones. All proposed amendments were finally withdrawn and the ordinance was passed by the vote of twenty-five to four.

This merger agitation lasted from early in 1902 until January, 1903, when the *mayor's veto* to the ordinance gave it the final jar. It did not meet with his approval and there was practically no chance of passing the ordinance over his veto; and it has not been done yet.

Friday, January 2, 1903, was another of those fateful January months for telephone business in Detroit. There was an assemblage in the council chamber that evening that had gathered to discuss the merger telephone ordinance then in the hands of the mayor, and it was stormy sailing from the start. There were some that were present who would have been glad to have changed the governing rules from parliamentary to Marquis of Queensbury. The council chamber *had been packed* with Michigan Telephone Company employes. There were four full rows of them, with others around the hall *too numerous to count.* They hissed every measure looking to the amicable adjusting of differences between the two Independent companies, so that business could be done. Their own speakers were cheered to the echo and measures favorable to the Bell company were roundly applauded. Representative business men and Independent interests were practically ignored in this remarkable gathering. One gentleman, in reply to a question asked by an alderman about rates, said the Bell company could not give lower rates because it *had to spend too much money buying Independent companies and public officials.* This man did not favor another company, because it would be just another plant the people would have to pay for, *as it was only a question of time when it would be absorbed.*

All arguments in favor of the ordinance were unavailing, however, and when the question of recommending that the mayor veto was put there was a triumphant shout of "ayes." There was no hope then that the Co-Operative Telephone Company would, dismissing all thoughts of an ordinance, go ahead and construct its plant under the state law governing telephones. This was the attitude of Jasper C. Gates, the attorney:

"Theoretically we can build a plant under the state law," said he, "but practically, this is impossible."

The ordinance was vetoed by the mayor, but the plant was partially completed, having installed a switchboard with an initial capacity of 600 telephones. It is claimed by the co-operative people that everything the company owns and all the work performed has been paid for, and all with the certainly small sum of $25,000; quite a difference between that and $900,000.

LONG-DISTANCE COMPANY.

Apparently the business prospects of the co-operative company appear to be very bright, for the officers of the first-named company have organized a long-distance company to do business with the co-operative. It is to be known as the Peninsular Telephone Company, with a capitalization of $25,000, ten per cent paid in. Articles of association under act 129 of the public acts of 1889 were filed, giving Arthur A. Cowles, president, 140 shares; Jasper C. Gates, vice-president, twenty shares; J. Carl Danziger, secretary, 100 shares; C. M. Burton, treasurer, 100 shares, and also trustee for forty shares.

After a long period of agitations two partially completed telephone plants are in Detroit, one with a veritable forest of poles and miles of conduit, laid by the People's company. Many ineffectual attempts have been made from time to time to use this material and construction to advantage, but without success, and the end is not yet.

The fifth annual meeting of the Kentucky Independent Telephone Association was held at Paris, Kentucky, on October 13 and 14. The meeting was a successful one. Much of interest was discussed by those in attendance. The officers elected for the ensuing year are. President, D. L. Pendleton, Winchester; vice-president, John T. Hinton, Paris; secretary, James Maret, Mt. Vernon; executive committee, David Prewitt, Winchester; George S. Shanklin, Lexington; J. L. Mitchell, Maysville.

The Telephone on the Farm

The spread of what is known as Independent telephony, which followed the running out of the fundamental telephone patents in this country, has had many striking developments, but none more remarkable than those which have given every farmer in the land the chance to rig up a telephone, and thus put himself in direct touch with the outer world. The ubiquitous trolley, running out into the rural regions from the nearest urban centers, has done much to change the conditions of rural and agricultural life; but over and above all, the telephone is proving the instrumentality of what is, as a matter of fact, a new civilization.

Only those who have traveled of late through the rural parts of the great Middle States and of those in the Northwest can have the remotest idea of the manner in which, finding the telephone available and cheap, the farmer has seized upon it with avidity, and connected himself up with some co-operative system in his own neighborhood, or again, with bolder effort, has pushed out and joined his own line with the network of some adjoining village. The co-operative principle has in this way received a new and striking exemplification while the economic outcomes, even at this early stage, are so wide reaching that it is hard to determine just where the effects of this change will stop.

It is estimated that during the last five years telephones have been put into nearly half a million rural homes. The farmer finds that with the telephone he can keep in touch with the market, selling his produce or live stock when quotations are the most favorable.

By sparing himself and his help useless trips back and forth for the purpose of delivering his products, or of ascertaining the status of the market, he now saves a vast amount of time in the course of the year. When he is assured by information over the telephone that he can sell to advantage he loads up his wagon, and not till then.

As illustrating the advantage of keeping in telephone touch with the market, an incident in last year's transactions in broom corn in Illinois is related. A prospective rise in the market was preceded by great activity on the part of the brokers.

Buyers from the outside began to clean up the broom corn at $60 a ton, when a telephone manager called up the farmers on his system and told them the market was rapidly rising. The result was that before the season ended they got $240 a ton for their crop. One farmer reports that in addition to getting nearly double the usual work out of his teams, through their being saved futile trips to market, he has been enabled to do away with the hire of two men, as he could spend more time on his farm and save the diminished output of the hands at work in his absence.

Another farmer saved all his buildings by being able to summon help quickly from a nearby town and also from his neighbors when a fire broke out. Still another, by getting a physician promptly, saved the life of his only son, when the delay of half an hour would have been fatal.

It is now a common practice for the country doctor to give directions by telephone for caring for the patient, both diagnosing and prescribing. In Illinois the speeches of a recent political convention were listened to by the farmers on a rural system as they sat in their homes from fifteen to thirty-six miles away. Being in speaking distance of his neighbor, not only does the farmer feel a new sense of personal security, but he knows that his belongings are safer from molestation than they ever were before. The telephone has been instrumental in causing the arrest of many horsethieves and outlaws and in some districts the farmers have almost broken up chicken stealing and petty larceny by telephoning the police and commission merchants of their losses, and thus enabling prompt arrests to be made.

The women and children come in for their share of the benefits of the telephone. During the dreary winter nights they can gossip with their neighbors, and they no longer live in dread when the men are away. The tramp is chary of performing his professional stunts where he finds a telephone wire running into the house, for he realizes that if necessary the whole neighborhood can be called in a few minutes.

That some women have ingenious ideas of their own as to the purpose of the telephone is evident from the stories that crop up from time to time of the experiences of the inspectors. One of these officers relates that one of his linemen went into a house to inspect the telephone on a rural line in Adams county, Illinois. Seated in a rocking chair, contentedly occupied with her knitting, was the wife of the subscriber to the system.

At first sight the lineman thought she was wearing a novel kind of headdress, but a second glance discovered the fact that she had tied the telephone receiver to her ear and was listening to every conversation that passed over the wire.

Another woman wanted to go on an errand some distance down the village street, so she took the receiver off the hook and left the cradle near the telephone, telling the central operator that if her baby began to cry she was to call her up at the grocer's.

An innovation in the use of the telephone which promises to be the vogue is already very popular. The local grocer or butcher, realizing that time is money, pays for the monthly rent of the telephone of any of his customers who spend $25 at his store during the month, or makes a corresponding discount for a smaller expenditure. He finds that in the increased amount of business coming through the greater ease of transmitting orders, and the reduction in his staff of order men, he can well afford to throw in the telephone service, which furthermore becomes a splendid advertisement for his store.

In the early days of the rural telephone the farmers were content to utilize their fence wires for intercommunication, and in many districts, particularly in the western states, this method so reduced the cost of installation as to enable many communities to have a tolerably effective service, which otherwise would have had to go without any. But the farmers are becoming more fastidious. They now want good service, and they are getting it.

The systems employed range from a single line, with from three or four to a dozen instruments connected, to comprehensive systems covering entire counties and having hundreds of patrons. For instance, in Cuyahoga county, Ohio, near Cleveland, where there is a population of about 14,000, there are over 1,000 patrons, the number in each township ranging from fifty to nearly four hundred. Great attention is paid to toll service, and the best construction and apparatus are insisted on as being in the long run the most economical.

An example of the village and rural exchange is New Augusta, Ind., with seventy-five subscribers, fifty of whom are farmers, the most distant being about seven miles. When a single neighborhood line with a few instruments attached is desired, a switchboard is not necessary. The subscribers

signal each other direct by giving different combinations of rings.

So easy has the organization of rural telephone systems become that it is safe to predict that within a very few years the majority of the 4,000,000 farmers said to be yet unprovided with telephone service will have followed the example of their more enterprising brethren and brought themselves within touch of civilization. If any community wishes to install a system, no matter how limited, it has only to communicate with a reputable installation firm to receive the fullest and the clearest instructions as to how to go about it.

A favorite method of organizing is for the farmers to form partnerships or co-operative (mutual) companies for the furnishing of service only to the locality in which the subscribers live. Sometimes the service is furnished by nearby telephone exchanges running lines into the rural districts.

In some places service cannot be given by city companies. In such case, the farmers can form themselves into a company, subscribe for the stock on pro rata or other basis, and install the system, running a direct line from their switchboard to that of the nearest town or city exchange. This is called the community system, the heart of which is the small switchboard, from which radiate in different directions the lines to which the various subscribers' telephones are attached.—*New York Sun.*

Abstracts of Telephone Convention Papers.

DEPRECIATION.

Depreciation is the lessening in value of a particular thing due to some change in its condition or a change in its relation to other things. As applied ordinarily to telephony, it refers to the lessening in value of a plant due to the decay of poles, wires, switchboards, etc. Some would have you believe that there is a depreciation in the plant due to the rapid advancement in the science of telephony. While this was undoubtedly true a few years ago, I believe that the time has come in which apparatus is so well perfected that no one need fear the necessity of having to throw it into the scrap heap before it has served out its natural life.

The object of this paper is to investigate the lasting qualities of the various materials and apparatus used in the construction of a modern telephone plant, and to determine the annual rate of depreciation of the parts and the whole due to the ravages of tear and time, and to mention the importance of giving it due consideration in the financing of a plant.

The argument is advanced that by proper maintainance of a plant it can be kept in as good condition as when first built. This, I think, is entirely unwarranted. A telephone plant, like all other human productions, will wear out. It is practically conceded by the best telephone engineers that the only business way to provide for this wearing away is to lay by each year a certain per cent of the original cost of the plant to be used for rebuilding when it is found to be necessary. This depreciation fund may be placed in bank, loaned at interest or reinvested in the telephone business, if thereby it will pay more than the current rate of interest. If this latter method be followed, it will be necessary to borrow money for rebuilding the original plant, but this will be justified, for during the time of operation the plant should more than double in size—increased by compound interest, so to speak—with only the original part of the plant to be rebuilt. So long as it is strictly borne in mind that there is a depreciation, and provision is made to meet it, all will be well, but if that which should be reserved for depreciation be paid out in dividends while the plant is new, an unwarranted premium will be placed on the stock and an injustice and hardship will befall the stockholder when the time comes for rebuilding.

Happily though for the Independent movement the greater number of the companies do, in one way or another, provide for depreciation, and they do it most abundantly. The percentage usually considered to be right varies between eight and twelve per cent. A most pleasing extreme from the company that lays by nothing.

Aside from the necessity of providing for rebuilding, there is another reason why depreciation should be studied—it enables the engineer to build or maintain the plant from the most economical materials (service, original cost, maintainance and length of life being considered). He must not use cheap materials, labor or apparatus because they are cheap.

The figures which I use have been decided upon after a vast amount of correspondence and investigation, and are not original. They represent the opinion, as near as I can ascertain, of men who are best informed on the subject.

A plant is divided into two general heads:

I. Office and subscriber equipment.

II. Outside construction.

The first division is divided into three classes—a, local battery; b, central battery; c, automatic.

Of these I shall discuss only the local battery and central battery. The automatic has not been in operation long enough for us to say anything regarding its lasting qualities.

a. Local battery systems were entirely used by both Bell and Independent companies up to about 1897, local battery boards frequently giving continual service in the Bell exchanges for ten and twelve years, telephones being used even longer than this. When it is remembered that these old boards and telephones were very inferior in design and construction and were not kept repaired in the best manner, are we not justified in saying that modern local battery switchboards and telephones built by reliable firms should last twenty years, if maintainance be properly looked after? This gives five per cent depreciation.

b. In central battery systems there is a finer, neater mechanical arrangement that is accompanied by much less wear and tear than in the local battery, and consequently a longer life may be expected. It is thought that twenty-five years of service may be had of a first-class central battery equipment. Thus four per cent depreciation.

Outside construction is divided into two classes—a, underground; b, aerial.

a. In underground construction, and especially conduits, we have the most permanent part of the plant. Conduits built of vitrified clay or terra cotta and concrete, being removed from sun and rain, freezes and thaws, are almost as everlasting as the pyramids themselves. A rate of two per cent is charged off to underground conduits, though I see no reason why one per cent would not suffice.

Underground cables: The great enemy of underground cables in the past has been electrolysis, but high insulation conduits and greater care in installation have about eliminated these difficulties. In the past cables were frequently destroyed, wholly or in part, by high potential currents and lightning discharges. However, by the use of improved protectors these have ceased to be factors. We have practically nothing to go by in determining the life of a well protected cable except guesswork. In view of the fact that an old cable is worth considerable as junk when discarded, a rate of two per cent has been decided upon.

b. Aerial construction: Poles. Cedar and chestnut poles are almost entirely used in this country. Cedar poles twenty-four inches to thirty inches circumferential butt measure last about fifteen years. Poles thirty inches and upward last about twenty years. Corresponding size chestnut poles will last ten and fifteen years respectively. As the tendency is toward using poles of the larger size, these only will be considered. Thus five per cent for cedar and Six and two-thirds per cent for chestnut.

Creosoted poles. Creosoted pine poles erected thirty years ago in England are still in good condition and will apparently last some time yet. I am informed by a gentleman who began creosoting paving blocks thirty-two years ago that the first blocks treated are still sound and good, apparently good for thirty-two years longer. He is of the opinion that creosoted timber can be depended upon for at least thirty-five years. A depreciation on poles and cross arms of three per cent.

Cross arms of first-class long leaf pine will last only about twelve years, eight and one-third depreciation. If arms are painted every two or three years they can be made to last as long as the best cedar poles. Five per cent depreciation.

To obtain the above figures it is necessary that arms and poles be not unduly strained, a factor of safety of ten being about right.

Pole Hardware: Bolts, braces, screws, steps, strand, etc., will last as long as the poles on which they are placed, if well galvanized. According to modern practice it is undesirable to use plain hardware of any kind.

Aerial cable: If aerial cable is well put up and not run through trees, and is well protected from lightning and high potential cur-

rents, it will last about twenty or twenty-five years, four per cent being ample for depreciation.

Copper wire: There is practically no depreciation in copper wire due to the elements. Cutting and splicing will eventually render it useless. Copper wire, as junk, will about half replace itself. Two per cent is charged for depreciation.

Iron wire: The life of iron wire varies considerably in different localities, three to five years being a fair average in smoky districts, while through the open country it will last as long as twelve to fifteen years. Under favorable conditions seven per cent is about right.

As a general summary, it can therefore be stated that in a modern exchange with central battery equipment and a large percentage of underground construction, creosoted poles and cross arms, copper wire leads and first-class maintainance should show no more than two and one-half to three per cent depreciation.

Toll lines of creosoted poles and arms, copper wire leads and well guyed will have a depreciation of about three per cent.

Medium and small exchanges with untreated poles and arms and galvanized iron wire, cable where necessary, from five to seven per cent.

First-class country lines, untreated poles and arms, galvanized iron wire, from six to eight per cent.

In conclusion let me say this: Build your plants well. Build them in that "logical way" like the deacon built "that wonderful one hoss shay," and your maintainance bills will be small. Impress on your maintainance department that "a stitch in time saves nine," then your depreciation will be at a minimum.—*By Henry V. Bastin, Lancaster, Ky., before the Kentucky Telephone Association, Oct. 13.*

ARGUMENT FOR INCREASED RATES.

The question is, why is an adequate rate higher with 1,000 telephones than with 500, and for 1,500 more than for 1,000? In the first place, the service is worth more because the service is twice or three time as extended and more valuable. This in itself should really answer the question, because all should be willing to pay a fair price for any service or article required. A thing that has an increased value usually costs some more to produce. In the case of telephone service where the subscribers are doubled and trebled it is especially true. It would take too much space to fully demonstrate to the satisfaction of all. I will give a few facts and suggest a plan to arrive at a correct understanding of the cost of producing telephone service.

The present plant was constructed upon the basis of ultimately supplying five hundred subscribers. To-day it is overloaded by more than half, with the same results that any overload produces, unsatisfactory service. Just as too small and too few cars fail to accommodate crowds that sometimes wish to move from one place to another. Just as too small water mains or insufficient power fails to deliver a sufficient quantity of water in populous districts. I might enumerate dozens of illustrations that are all well understood. Our plant to-day is a 500 subscriber plant carrying about 1,100 subscribers with a great demand unfilled and a new demand is near at hand with long distance connections that will enable our subscribers to talk to Kansas City, St. Louis and the country generally. We must not only have the line capacity, but a very much superior quality. Quality must be considered in making a price on any article or service. While a grounded system—that is, one main wire from the central office to each telephone and one wire to the ground—that is carried along on poles will accommodate a 500 system and will give fairly good local service. The wires not being so numerous and conversations more limited, hence the noise and cross talk is not so very objectionable in such a system. While, as stated, a system built upon this plan will give quite satisfactory service to 500 subscribers, it is not satisfactory with 1,000 and over, because the cross talk is very objectionable. The slowness of central becomes more and more noticeable. While it is possible to get some service from such a system locally, it could not be used for long distance at all. The remedy is to run two wires from the central office to each telephone, with the result as plainly seen that just twice the number of wires are needed to accommodate the present number of telephones and instead of 1,100 wires running into the office there will be 2,200. If the present poles have all the load they can carry, it is quite plain that more must be set. Twice as many cross arms, twice as many pins, twice as many glasses, twice as much wire and more trouble to keep up. We propose to furnish metallic service for the new rate. It is quite evident that the cost for outside construction is much more expensive for this service than the grounded or common return system. This must be perfectly plain to any one by this time. Because we propose to say metallic service, you now have the other sort. Now let us go to the central office and look at the equipment necessary to accommodate 500 subscribers. It is well understood that the work is done by girls. Two girls can handle 500 subscribers, the connections being made by means of cords and plugs that are placed in openings by the operators, made on the board, that each subscriber's line terminates in. It will be understood that these cords are about five feet long, so that a calling subscriber at one end of the board wanting a connection with a calling subscriber at the other end of a 500 board, the cord is long enough to reach from one subscriber to the other. A switch-board to accommodate this sort of an exchange is quite simple and can be purchased with suitable terminals for, say $3 per subscriber. Now let us look at an exchange of 1,000 and over—we propose providing for 1,500 to 2,000 subscribers. We have seen how the connections are made with cords about five feet long, this being about as far as an average girl can reach. We have also seen that two operators can handle 500 subscribers. Now we add 500 subscribers, making 1,000. Operators can not reach from one end of the board to the other, nor can they do so by passing the cord to the one at their side. In the first place the cords will not reach, and some other method must be provided. The next step, and the one in use by us at the present time, is to use the service of two operators to complete each call that is to be reached away from the receiving operator's position, with the result that we now have eight girls waiting on 1,000 subscribers where we had two handling 500. Nor is this all. Four cords are used each time instead of two, causing twice as much wear. This one item, amounting to at least $175 per year at this place, is only one of many other expenses. To properly accommodate this number of subscribers a switch-board will cost at least $9 per subscriber, or three times what a 500 line board will cost. Again the work in the office of a 500 exchange is much less than 1,000. To illustrate, if each subscriber in a 500 exchange calls every other subscriber once, there will pass through the exchange 500 times 500 or 250,000 calls. If an exchange of 1,000 subscribers calls every other subscriber once there will pass through the exchange 1,000 times 1,000 or one million calls. The subscribers have doubled the calls and have increased by four the work of making connections. Wear and maintainance are also greatly increased. To sum up:

First. Increased cost. Consequently increase in interest charge, depreciation and maintainance.

Second. A system that will give satisfactory service to five hundred will not serve 1,000 satisfactorily, nor can it be used at all for long distance service.

Third. It takes twice as many wires, cross arms, pins, insulators and many more poles to accommodate a metallic system than a ground or common return system.

Fourth. It takes four times as many operators to handle one thousand subscribers as it does five hundred subscribers.

Fifth. It costs three times as much for central equipment to handle one thousand subscribers properly than it does to handle five hundred subscribers.

Sixth. If there are any that are not satisfied I suggest that the committee of forty appoint two men, the city council two men and the resident subscribers two to go further into details.

Seventh. Let it be understood that we are not asking for more money for the kind of service now furnished, but we do ask more for full metallic, single line service.

In conclusion let me say that the rate was adequate for an exchange of 500 and less with grounded system, but something better is needed, demanded, and must be furnished.—*Theodore Gary before the city council of Atchison, Kansas.*

THE RURAL TELEPHONE.

Nearly ten years ago the farming section of Illinois and Indiana began to fight the telephone monopoly. It was exactly then as it is here with the farmers. We could only get service at heavy cost, and then not in remote sections. We were in the habit of constructing lines at our own expense and presenting them to the Bell company and paying for each telephone something like fifty and one hundred dollars a year. We finally grew tired of the abuse to which we were subjected and then began the system of rural telephones which is now strung out over that section of the country.

I live six miles from Union City, Indiana, and my telephone costs me less than a dollar a month and I have two instruments, one at the house and the other at the barn. We put up our system, fifty-two farmers taking stock.

Our plant of forty miles, good poles and wires and modern instruments, cost us less than $100 apiece for everything. That was three years ago. Since that time we have received back in dividends the full amount of the first cost. This was made up from the first charge for service with which we taxed ourselves. That was made up partially from outside tolls. We are now establishing a sinking fund, and will soon be in a position where our expense for service to the original co-operative company will be nothing. We have our own board of directors and employ one man, who keeps all instruments and lines in condition. The law gives us the right to connect by switchboard with any other line in the state. Thus the various farmers' co-operative companies across the state are used.

The rural service extends into the adjacent villages and our service is infinitely better than when we relied upon the Bell company. The foreign exchange is sometimes slow, but it is the village and the nearby business which we count on and which is the real end sought. Now is the time for rural co-operative companies to get together, for the patents on the Bell instruments have expired, and in addition the apparatus furnished by independent

manufacturers is superior to the Bell make. We buy them everywhere. Nearly all of our subscribers have an extra instrument for an emergency, and when we thrash or are building we run an extra wire to the scene, hang up our extra instrument and talk direct with the house or the village at pleasure. This saves infinite troubles in running back and forth.

Of course Canadian farmers will soon acquire these rural telephones. You have just begun to get a taste for them. What you pay here in three years for inferior service in the rural districts will equip a good line, which you will own, and it will be but a short time until Canada will awaken to the advantages of rural telephony.—*By John C. Ray, before the Toronto Exhibition, Sept. 20, at Toronto, Canada.*

SOME PAST EXPERIENCES IN THE TELEPHONE BUSINESS.

My experience in the telephone business began from my interest in a machine of any kind, and, recognizing its vast possibilities, and the benefit it might be, I kept tinkering away at it until the present time. My first experiences were with a jack-knife, a screw driver, a box, wire and a thread. A friend of mine, who is a physician, wanted a telephone from his house to his office, across the river, and he put up a little box that was thumped in for a signal, and then it would transmit the voice if all the conditions were right.

We whittled out transmitters and receivers, and we added some magnets so the transmitter would work a little better, and they were an improvement over the ones we had.

My friend decided he would use batteries, though the Bell patent had not then expired, so both he and I purchased some batteries, made some new transmitters, put on the batteries, and lo, we had a telephone that would talk. I put a line from my place to Central City, three miles, to a relative of mine. We then connected with my physician friend, and the first line of telephone in Linn county for private use was put in working order. At the present time the farm house in northern Linn county that is without a telephone is an exception. The whole country is spider-webbed with them. Soon after we put in the batteries the Bell manager came up and attempted to frighten us into taking out the batteries, but we didn't bluff and the batteries stayed in. Soon after this we bought some transmitters and have been changing for the better all the time. Our first magnets were charged for us by the street railway company of Cedar Rapids.

This beginning of private building of lines was the beginning of the Bishop Telephone Company. It was organized under the laws of the state and incorporated, and stock enough sold and paid up to construct a line from Central City to Prairieburg, Coggon and Paris, and in the spring following we constructed to Manchester, Marion and Walker, and then we reached out to Vinton, Shellsburg, La Porte City, Monticello, Dyersville, Bell Plaine and other minor points.

I was the electrician, and saw the plant growing from the small beginning to connections that were almost state wide. In March, 1902, the old Bishop company sold out, and it was reorganized into the Linn County Telephone Company.

All we know in this life grows out of experiences either of ourselves or some one before us. All that is taught us from childhood to the grave is the experience of some one who has preceded us. Experience soon taught us the value of close connections with everything that looked like a telephone line. We learned that a farmer would send a message over our toll line much quicker, or would be more apt to send one if he had a telephone in his own house than he would be if he had to come to town to send the message. He would be more apt to write. This being the case, our experience taught us to cultivate rather than antagonize the private farmer lines that we saw were bound to be built over the country. I was not connected with the old Bishop company for almost a year and spent that time building lines out of Coggon, in all directions, and now have a system up there, connected with the Linn County Telephone Company and now owned by them, that fairly spider-webs that whole country.

My experience with the farmer lines is that they are somewhat difficult to deal with. The most serious defect about all the rural lines in our part of the country is entire lack of organization. They have tried to organize and get on some kind of a business basis, but they know nothing about the telephone business, they seem to distrust each other, and all want free exchange with all other points, and want free exchange with the toll lines, and either cannot or will not see why it is an unfair proposition, unless the lines can be controlled by some organization and somebody be made responsible for maintaining the lines, keeping the instruments in order and looking after the business, giving service constantly.

Free exchange is the great bugbear with all the farmer lines. They are looking for something for nothing all the time, and when they have a meeting two-thirds of the time is consumed in discussing how they can work free exchange out of all the central offices in reach.

They do not seem to recognize the difference between a switch fee and a toll fee. If they are away from home and want to get home with a message they think they have been charged a switch fee when it was a toll fee they were charged. No satisfactory arrangement has ever been made for free exchange, and never will be until the lines are some day, under some kind of a deal, controlled by some organization strong enough to keep the lines in order and have the business so systematized that it is the same as if it was controlled by one man. In any proposition of this kind, they always mistrust that somebody is after the line, to gobble it up, and on this account it goes on year after year, the lines and instruments out of order half the time, constant complaints of lack of service, while the toll lines, thoroughly organized, are in constant working order, giving service night and day.

My experience leads me to the conclusion that the only way for the farmer lines to ever have good service is to be controlled by some organization that will and can keep the lines in order. The whole drawback with the farmer lines is that they want too cheap service. If they could have their lines and instruments kept up in good order, have the use of all the Linn County Telephone Company's lines for ten or twleve dollars per year, they would be much better off than they can ever be under the present system, or rather the present no system, but they now pay the paltry sum of $1.75 per year for running into the central office, get free exchange with very few places. The lines are not kept up, the instruments are not kept up, there is no one responsible for the condition, and all the lines that run to the exchange are loaded with telephones, so that service of any certainty is an impossibility, but inasmuch as they have been having their exchange kept up for $1.75 per year, they grow frantic when $12.00 per year is mentioned, and think some one is trying to take their lines away from them, destroy the whole farmer line fabric and then put prices where they please.

This utter lack of organization is, in my experience, a very serious drawback to the whole telephone system in the north part of the county around Central City. It does not give them half service, and does not give half what it would if properly managed.

This condition very clearly shows that metallic circuits are far and away the best investments to make when building an important line. If not metallic then two wires, with the bells on one, the transmitters on the other, for company lines or lines accommodating several telephones, is better perhaps for that class of lines than the metallic circuit.

My experience leads me to conclude that in erecting a plant, the best is always the cheapest in the long run. The best gives the best service. The best service is the most satisfactory to patron and operator and creates a mutual interest that poorer things will not. It is a bad investment to get a man to put in a telephone and give him a cheap instrument. It is not good business sense to have a poor switch board when the investment of a little more will get the best.—*By Fred Bishop, before the Northeastern Iowa Telephone Convention, Sept. 25, at Cedar Rapids, Iowa.*

THE OUTLOOK.

While the writer does not feel competent to discuss the outlook as pertaining to the telephone field at large, I will in the following remarks have in mind the outlook for Northeastern Iowa.

There seems to be little danger that the Iowa Bell Telephone Company will give us any great amount of trouble in the future. In some cases the Iowa company has made gains, but these gains have not been of very great importance. In certain cases that have come under my observation, the gains made have been entirely due to the mismanagement of the Independent companies. Wherever opportunity presents, the Iowa company is connecting up with the mutual and local companies that are building and organizing in the territory of poorly managed Independent companies. Such mutual or local concerns are refused toll line connections by the Independents, and consequently they go over to the old companies for long-distance service.

As soon as the new company has opened up its office, the agent of the Iowa company happens along with a proposition that the new office handle the toll business of his company for a commission. This proposition is gladly accepted. No arrangements seem to be made for connection of lines, but nevertheless the connections are made on the quiet and the subscribers talk over the Bell lines from their telephones. I do not know that this has been done in many cases in Northeastern Iowa, but there seems to be a prospect that considerable of this sort of business may be done unless some of our Independent friends take better care of their territory. Bell competition is the most formidable in the larger towns and cities, and every gain in the small villages will prolong the struggle in the larger towns.

The time has come for the Independent telephone men of Northeastern Iowa to settle down to business. The day of the promoter is passing. We occasionally hear something about the big promoter and consolidator, who is about to put us all out of business, but these rumors are hardly to be taken seriously. It is time for us to get down on a solid working basis, to plan and build for success in the operating field. The promoter has built to sell. We have an entirely different proposition. We must make our success out of the operation of these institutions. The healthy growth and development of our systems will depend on our ability as telephone business men. It seems to me that the telephone business is subject to many of the same influences that affect other lines of business, in fact the telephone business is not so much different as is generally supposed. We will suffer in the hard times and will prosper when

there is general prosperity. The same economy and careful management is necessary as in other business.

Those companies that are collecting the highest rate of tolls and rentals would seem to have the brightest outlook, but this is not necessarily true, for if these tolls and rentals when collected are injudiciously expended, these companies will not be as success as other companies whose rates are lower, but whose management is careful and judicious. If the mercantile business or the banking business were given over to such management as some of our companies suffer, they would be bankrupt in a short time.

Telephone companies that are expending large sums in enterprises, where it is unreasonable to expect returns to justify, simply to satisfy the vanity of some construction man; companies that are paying large dividends from an old, dilapidated system or are trying to pay a good dividend on watered stock; companies that purchase material without regard to the intrinsic value of the same; companies that are paying fat salaries to useless employes; companies whose linemen should be classed as bums or common drunks; such companies do not have a bright outlook.

For the company whose rates are normal, whose system is kept up-to-date and whose patrons get the worth of their money, the outlook is good. Those companies will benefit by the general prosperity which all lines of business are enjoying.

There seems to be a constant effort on the part of telephone interests toward consolidation. Each system is reaching out to and including the surrounding towns, buying up the neighboring exchanges, or two or more companies are organizing into one larger company. On the other hand may be observed a tendency toward disintegration. Some of the larger companies are losing territory and their system is being undermined. Mutual farmer companies organize in each neighborhood, and local companies in the towns, and build competing systems. These new concerns seem to be in sympathy with each other and combine their efforts, going after the larger Independent companies in much the same way that the Independents go after the Bell.

I think one reason why these new companies are springing up in the territory of the larger companies, is because the Independents fail to cover their territory properly. For telephone exchange purposes, the unit is not the town, but extends to the trade boundaries of the town, and the company that builds a small system in the center of this community, where the population is most dense, and refuses or neglects to build for the rest of the community, is likely to encounter trouble, and may have difficulty in holding the territory.

The question which the telephone men of to-day are asking is, will the telephone business fall into the hands of a few large companies? Is the movement towards a consolidation correct? I am not prepared to answer this question, but will offer a few suggestions.

The Bell company, protected by the patents, was given over twenty years to establish it monopoly. It covered the United States after a fashion. It built small exchanges in the large towns and charged for its service all the traffic would bear. The small towns could not secure exchange service.

The toll business of the Bell company seems to have been much more successful than its exchange business, as almost every small village was given a toll station. The fact that the Bell company was not able to maintain its monopoly, having had twenty years in which to establish itself, leads me to believe that the exchange business is not a monopoly by nature. A large system must necessarily be managed by agents who have no financial interest in the business further than their salaries.

On the other hand, the toll business would appear to be a monopoly by nature and will be the most successful when handled by large companies—the larger the better.

The toll business may be said to follow the law of increasing returns. The larger the enterprise the cheaper the cost per unit of quantity of service.

I fear that we will never have the most successful toll system for Northeastern Iowa until the long-distance business is handled by one company.—*By Robert L. Parker, before the Northeastern Iowa Telephone Convention, Sept. 25, at Cedar Rapids, Iowa.*

BLIND TELEPHONE OPERATOR.

For the sightless eyes of Edward V. Shaich the intricate new switchboard in the recently completed exchange building of the Cumberland Telephone Company at Evansville, Ind., has no mysteries. With as much deftness as the young women operators possessed of keen vision, he inserts plugs in their proper jacks when subscribers call, keeps certain note of every drop that falls and responds to every duty of the business even more swiftly than experienced operators with normal eyes. And all the time the switchboard before him is no more than a dark blur. He perceives strong light and when objects at close distance intercept his range he knows that they are there, but whether they are merely piles of boxes or the complicated apparatus of a telephone exchange he is unable to tell.

Shaich's case is unique in the annals of the blind. There have been blind men and women, perhaps four in all, who have operated small party exchanges in the country districts by means of distinguishing bells. But Shaich uses neither bells nor other aids than those afforded to the operator of good sight.

As assistant wire chief Shaich will have his seat at the "trouble" desk. It will be his duty to receive all complaints from subscribers and report upon them to linemen and repair crews, after having ascertained, by complex dials and resistance measurers, familiar to expert electricians, where the trouble lies in the disordered lines.

The "trouble" switchboard in the new exchange is perhaps eight feet long and seven feet high. The operator sits before some sixteen or eighteen plugs, some of which are reserved for connection with the discorded lines when subscribers report a defect. Other jacks are for inside connections. Underneath each jack appears an opaque lamp, which lights at a call, and at the moment of illumining the current also works a relay to the rear of the board. The only signal that Shaich has of the call is the sound of this relay, and so well disciplined is his ear that he can tell it above the noises of the street or the building. By feeling the lights on the board underneath the several jacks he can perceive by touch the lighted lamp because of a difference in heat. This difference in heat is not perceptible to the ordinary person's touch, but Shaich, by long development of the sense of feeling, is able to tell many minute differences. By responding to the subscriber in trouble Shaich will find the number of the line, notify the exchange operators on another floor to put the line temporarily out of use, and then will begin with his instruments to ascertain resistance and by other calculations known to experts in telephony will locate from central the defect in the individual line.

When Shaich began in the Grayville office of the Cumberland company five years ago he had no experience in telephony, but now constant application by close "touch" observance of every instrument used in a telephone exchange and by conversation with friends who have been only too willing to inform him, he has gained an expert knowledge of many lines of his particular work. Textbooks have been denied him, but without them he has perfected himself remarkably in telephony.

"In Grayville," said Mr. Shaich, "I had little difficulty in learning all the operations of the exchange, and I had no complaints. The switchboard there has 100 drops, amounting with party lines and outside district calls, which came through our office, to about 170 subscribers all told. The relays and the drops furnished the only means for me to distinguish between calls. The moment a relay sounded I knew a call had come in, and by the peculiar sound of the relay I knew which one it was. I could distinguish easily between the sounds of different drops and knew what the subscriber was calling for. Sometimes if five drops fell almost simultaneously I was able to distinguish among them without difficulty. My busiest time was in a fire, when there happened at times to be as many as fifteen calls all at once. But my ear supplied the absent sense of sight, and I answered the sounds of the drops about as expeditiously, I think, as another operator possessed of clear sight.

"I hope to succeed in the work to which I will be assigned here. It has not been in my line, but I am trying to become familiar both with principles and practices, and I hope by the time the new exchange is ready for operation to be ready also."

As a blind man Mr. Shaich finds his way through the halls and passage ways of the new exchange building with ease.—*Evansville (Ind.) Journal-News.*

Independent Telephone Systems.*

By J. J. NATE.

The articles which have appeared in TELEPHONY with relation to Independent telephone systems were prompted by a vast amount of literature circulated by the Bell company, or some of its allied interests, and calculated to retard the Independent movement. This literature has appeared in pamphlet form under the headings: "Opposition Telephone Systems—Their Failure and Reasons Therefor," "Monopoly vs. Competition," and "Fifty-Four Reasons." The reasons advanced were confined to letters received from individuals who objected to competition in telephone service, and which, in many instances, are simply reprints from a previous production.

Through the courtesy of the Twin City Telephone Company, Minneapolis and St. Paul, I am able to present evidence of a most conclusive and irrefutable character from the individual most vitally interested in the question of competition in telephone service, the subscriber. The evidence secured in favor of competition in the telephone field is overwhelming, as shown from the answers received to five questions of two subdivisions, which were submitted to telephone subscribers throughout the country generally. The number of replies received to these questions amount to over 1,400, and are secured from towns and cities where the Bell and the Independent systems are in competitive operation. These replies are carefully tabulated, and the result is shown in the total number of answers received. Hundreds of answers, however are of such a striking character, that in order to show the sentiment of the users of telephones throughout the territory covered by this investigation, many literal replies, other than a direct "yes" or "no" are printed in full.

The 189 exchanges selected, from which points these replies are received, operate through some twenty states and employ many different systems of apparatus. An honest effort was put forth to secure an opinion of the real sentiment, of the subscriber, where competition in the telephone field existed. The result is certainly most remarkable, and only emphasizes the statements made from time to time regarding the strength of Independent telephony, and its position in the field to-day.

As listed by states and exchanges, the number of replies in total received therefrom follow:

	Exchanges.	Replies.
Arkansas	2	8
Florida	2	11
Georgia	2	9
Illinois	12	91
Indiana	21	139
Iowa	14	82
Kansas	5	37
Missouri	3	18
Massachusetts	3	22
Michigan	23	108
Kentucky	7	45
New York	29	151
Ohio	64	364
Pennsylvania	10	43
Rhode Island	1	7
Texas	13	70
Wisconsin	18	117

This list is made up from towns and cities as follows:

Arkansas—Little Rock and Texarkana.

Florida—Tampa and Jacksonville.

Georgia—Savannah and Augusta.

Illinois—Cairo, Champaign, Dixon, Freeport, Galesburg, Jacksonville, Lincoln, Monmouth, Rockford, Rock Island, Spring Valley, Urbana.

Indiana—Angola, Columbus, Connersville, Crawfordsville, Fort Wayne, Hope, Greensburg, Jonesboro, La Fayette, Logansport, Marion, Michigan City, Noblesville, Pendleton, Richmond, Rushville, Salem, Shelbyville, South Bend, Vincennes, Wabash.

Iowa—Burlington, Iowa City, Atlantic, Creston, Marshalltown, Centerville, Fort Dodge, Des Moines, Davenport, Mount Pleasant, Carroll, Oskaloosa, Mediapolis, New London.

Kansas—Hutchinson, Emporia, Wichita, Atchison, Ottawa.

Missouri—St. Joseph, Joplin, Maryville.

Massachusetts—Haverhill, New Bedford, Fall River.

Michigan—Adrian, Alpena, Battle Creek, Bellaire, Benton Harbor, Central Lake, GrandRapids, Jackson, Ludington, Iron Mountain, Marcelona, Michigan City, Muskegon, Northville, Owosso, Ovid, Petoskey, Pontiac, Reed City, St. Joseph, St. Louis, Stanton, Three Rivers.

Kentucky—Bowling Green, Lexington, Louisville, Paducah, Owensboro, Henderson, Frankfort.

New York—Courtland, Niagara Falls, Schenectady, Albany, Seneca Falls, Corning, Binghamton, Brockport, Rome, Auburn, Syracuse, Johnstown, Kingston, Geneva, Utica, Roundout, Logersville, Connersville, Clyde, Oswego, Watertown, Lyons, Saratoga Springs, Tonananda, Cohoes, Batavia, Rochester (not in total count), Elmyra.

Ohio—Akron, Amelia, Ashtabula, Barnesville, Belmont, Berea, Bowling Green, Bradford, Brookville, Bryan, Bucyrus, Cadiz, Cambridge, Canton, Cedarville, Clyde, Coalt, Collinwood, Conneaut, Cudeville, Defiance, Delaware, Elmore, Fayette, Fostoria, Freemont, Gallipolis, Galion, Gibsonburg, Greensfield, Jackson, Jewett, Kenton, Lancaster, Lebanon, Lima, Lorain, Mt. Vernon, Macksburg, Mansfield, Marion, Martin's Ferry, Massillon, Melford, New Philadelphia, New Richmond, Norwalk, Painesville, Piqua, Portsmouth, St. Clairsville, Sandusky, Scio, Shelby, Sidney, Tiffin, Toledo (not in total count), Troy, Urbana, Washington C. H., Wellston, Wellington, Xenia, Zanesville.

Pennsylvania—Altoona, Chester, Connellsville, Easton, Erie, Johnston, Lewistown, Pittsburg, Stroudsburg (not in total count), Warren.

Rhode Island—Westerly (not in total count).

Texas—Beaumont, Corsicana, Denison, Houston, Orange, Paris, San Antonio, Sherman, Taylor, Temple, Texarkana, Tyler, Waxahacie.

Wisconsin—Appleton, Ashland, Beloit, Delavan, Evansville, Fond du Lac, Fort Atkinson, Janesville, La Crosse, Merrill, Monroe, Racine, Rhinelander, Sharon, Sheboygan, Sparta, Waupaca, Wausau.

Mississippi—Columbus.

Virginia—Norfolk.

Alabama—Mobile.

In addition to replies received from subscribers, nearly 200 letters are at hand from officers representing the various exhanges. These letters are confined to the dates of installation, number of telephones in operation by the Bell company then, and the number of telephones in service in 1903 by both companies. As the reports were not always complete, the total number of telephones practically in use by each company, at the present time, follows:

State.	Exchanges.	Bell Telephones.	Independent Telephones.
Wisconsin	26	4,193	10,954
Michigan	15	6,801	12,363
Illinois	13	5,982	10,568
Indiana	21	4,171	18,216
Ohio	47	14,361	35,612
Kentucky	6	4,290	11,323
Rhode Island	1	.....	.....
Massachusetts	3	5,256	2,425
Kansas	5	1,450	4,575
Texas	10	7,210	7,698
Florida	1	420	1,170
New York	19	16,011	21,868
Iowa	10	4,969	9,006
New Mexico	1	325	385
Pennsylvania	6	3,334	6,580
Georgia	2	2,350	2,800
Missouri	3	2,200	2,850
	189	84,323	158,393

The five questions submitted to telephone subscribers are

*Editor's Note: This is the seventh paper in Mr. Nate's series.

as follows: 1. Has competition resulted in better telephone service in your city?

Subdivision 2: By an improved service on the part of the Bell company? Answers to subdivision 2: Affirmative, 982; negative, 154.

Subdivision 1: As given by the Independent telephone company? Answers to subdivision 1: Affirmative 1,245; negative, 26.

2. Has competition increased the number of telephone subscribers?

Answers, affirmative, 1,261; negative, 8.

3. Has competition brought about greater civility and more courteous attention to the wants of the subscribers?

Answers, affirmative, 1,222; negative, 37.

4. Have rates for telephone service been reduced by the advent of competition?

Subdivision 2: By the reduction of Bell rates formerly charged? Answers to subdivision 2: Affirmative, 979; negative, 120.

Subdivision 1: By the establishment of rates by the Independent company lower than formerly prevailed? Answers to subdivision 1: Affirmative, 1,238; negative, 45.

5. In your judgment would it be preferable to return to the conditions prevailing before the advent of the Independent company?

Answers, affirmative, 14; negative, 1,245.

In order to show the feeling, appreciation and deep interest felt by the subscriber as regards telephone service, it is thought best to quote largely from the replies received. In answer to the first question, 182 miscellaneous answers, shown in the total, all express a strong interest in the matter. In addition to such replies as "It certainly has," "Very much better," "Decidedly," and "Very much so," we select additional answers as follows:

The following answers were received to the first question and its first subdivision:

Excellent service being rendered.

Fifty per cent better service.

Yes; the service of the Independent company is much better than the Bell had been before the advent of the Home company.

It has decidedly. The improvement must be attributed to the Independent company.

It has. The Twin City telephone service is good.

Yes. A most wonderful improvement over service by Bell company.

The new company is giving the best service the country has ever had, beyond doubt.

The Independent company is great improvement over what Southwestern T. & T. Company was prior to Independent.

The best of service is given.

The Independent company have established the finest and most modern plant here and is serving over 2,500 subscribers or over five to one furnished by the Bell.

Yes, much greater and better. The Bell has improved some since the Independent company came in.

We had no competition until Independent telephony entered the field. Its service is first-class—superior to the Bell.

In my judgment much better. Decidedly better than the Bell formerly gave.

The improvement is entirely of Independent origin.

Yes, the service of the Independent is excellent, and the service of the Bell company has been much improved.

The service of the Independent companies of up-to-date construction is far ahead of the Bell of to-day, and the Bell of to-day is very much better than before the competition.

Before the Mutual there were few telephones. Now there are 600 or more, and many applications. Surely 600 is better for any subscriber than seventy-five. Old Bell rate prohibitive with masses.

The Independent company has the best service. That is the secret of its success.

Think the Citizen company is giving the best service Jackson has ever had.

To a degree that is almost beyond comprehension.

Yes, the service is fifty per cent better and it is due entirely to the Independent company.

The Independent company has given the very best service possible.

Yes, an hundredfold.

Yes, a very superior service.

When the Independent company was organized the Bell had about seventy-five subscribers and the Independent company now has about 450 and the Bell about the same as formerly.

Yes, decidedly. Independent more enterprising and extensive.

Most decidedly. Practically having no service until the Bell had competition.

Without a doubt, the Independent company has given us by far the best service.

Decidedly superior service.

Independent people give first-class service.

Very much better service than ever furnished by the Bell company.

Most emphatically yes.

Infinitely better.

Decided improvement, and by recent establishment of new switchboard I look for very perfect service.

Answers to second subdivision of first question follow:

The company's service has improved very much since it has competition.

The Bell company has made wonderful improvements since the Independent telephone started.

The Bell of to-day is very much better than before the competition.

It has. The plant has been greatly improved. The greatest improvement is shown on the part of the operators.

The Bell has to pull out.

This company withdrew from field when Independent company commenced business.

Thirty days after the opening of our office the Bell people quit doing any local business.

Yes, very marked improvement.

Bell company quit soon after local line was instituted.

Reduction in number of subscribers has brought about better service, as list is within facilities, where before it was beyond same.

Since Independent was established here, the S. W. T. & T. company has greatly improved its service.

We are not subscribers to the Bell since the advent of the new, but understand from others that it is better.

Yes, but the new company does many times the amount of business as the other.

Yes, but the Bell company does not have a very large list of subscribers or patrons.

Bell were compelled to give better service after Independent came in.

It has also extended its lines and gives excellent service.

Yes, by an increase from 68 to 540 connections.

Yes, and by excellent service given by its competitor has made both better.

The greatest improvement imaginable and *courteous treatment.*

Both companies are improving all the time.

More accommodating and better service.

Emphatically yes.

Yes, I think so, but I am not a subscriber to the Bell. But it has made many improvements in its plant since the installation of the new company.

The old Bell system was one-line ground return—a poor service. Now it has metallic circuit and furnishes good service.

Somewhat improved but still inferior to Independent.

Improved very much. When installing Independent company the Bell company put in new switchboard and improved its service very much indeed.

It has. Bell company has put in switchboard and other improved equipment and is giving more prompt attention to calls.

Bell service has much improved in courtesy shown and in efforts to please.

Answers to question 2, Has competition increased the number of telephone subscribers? follow:

Very materially. Possibly quadrupled.

There are several times as many as formerly.

About fifty per cent.

With no competition there were 450 Bell telephones in this city. There are now 1,600 Independent and 1,000 Bell.

I know that there are about three to four thousand more telephones in Johnston now than ten years ago.

The Bell company had about 100. The local company has now about 3,000, exclusive of the toll list.

About 30 to 1.

Yes, from a list of 100 to 125 subscribers with no opposition, the Independent company now has about 2,000 subscribers and Bell 125.

Increased many thousand per cent, as few persons could afford the exorbitant charges of the Bell company.

From twelve Bell subscribers in 1897 to 200 Bell subscribers and 400 Independent subscribers at this date.

Increased by Independent four times.

Old telephone has 300 now. New company has 2,000.

Four times over.

Yes, 1,800 Independent; 600 Bell.

Very much so. The Bell has lost, but the local has 700.

That or something else has increased the subscribers in this vicinity 1,000 per cent since the coming of the Independent.

We think six times as many now.

Very much. Over four hundred per cent and still increasing.

Yes, many times. Before we had competition we had fourteen telephones. Now we have nearly 300.

Increased them from 25 to 225.

Very largely so on the part of the Independent company.

Yes, from 200 to 1,500.

Yes, 400 per cent.

It has, and we now do at least three times as much business over the telephone as when we had one company.

Yes. It has, first, because of the heavy reduction in price; second, because of improved service; third, because of desire of people to get away from Bell company, and fourth, because of local people being interested in company.

Good service and low rates increased the subscription from 600, the highest the Bell ever had, to 2,600 operated by the Independent company.

In our city at least 400 per cent.

Before Independent came in Bell had 300 subscribers. Now it has about 500. Independent has 1,800 subscribers.

Yes, when Independent started four years ago Bell company had about 400 subscribers. Bell company now has about 300 subscribers and Independent 1,800.

We have grown twice as much as we thought possible, but do not think Bell competition is strong enough here to have had much effect. Growth is from other causes.

Twenty times as many telephones in use now as when Bell company had field to itself.

Greatly. Formerly paid $50 per year for our telephones and had access to 450 telephones. Now pay $42 per year for two telephones (one exchange, old and new) and have access to nearly 2,000 telephones.

Bell company had 115; have less now. New company have about 215 and cannot put them in fast enough.

Yes, very largely for the Independent company. We started with the expectation of getting about 200 telephones in 1897. Now we have nearly 1,200 subscribers and applications coming faster than we can supply them. The Bell is not in it, though it has offered in some cases one-third cut rate to private houses.

To our knowledge in two cities of 8,000 trebled the Bell and the new company about twice the number of the Bell.

About 75 per cent in the country, and 200 per cent in this town.

Yes, before the Citizen company started over five years ago there were only 150 telephones being used in our county; now there are 1,400 Independent and 300 to 400 Bell.

Was far beyond our most sanguine expectations.

A very large increase, but large falling off with Bell.

Yes, about 600 per cent.

The number of subscribers here has been greatly increased since the Independent company organized, and we suppose this is due largely to competition.

Yes, from 88 to 1,600 telephones.

Yes, many would not put up with old service.

"Has competition brought about greater civility and more courteous attention to the wants of the subscribers?" third question, brought these answers:

Yes, the Bell company had been very gruff and indifferent, while there was an amazing change as soon as the local company was in the field.

Conditions in this respect have been greatly improved.

We never knew what good service was until the Independent started here.

Yes, wonderful improvement.

The Independent has always been courteous and obliging. Not so with the Bell company. It is still independent and cares nothing for the public.

Most emphatically yes.

I must say that the service of the new company is A1 and the operators are very accommodating, and on that account prefer to use it.

Yes, it has been the means of vast improvement in every way.

To such an extent that we might say the Bell did not know what civility really meant.

Surely an improvement in every way.

New company aimed at courteous service from the start.

Yes, decidedly so. I believe Ottawa has as good telephone service as any town on earth.

Yes, when in control of the city the Bell gave any old kind of service, and you had to wait its pleasure for that; now both companies are up and coming.

The Bell people are not "in it."

It certainly has. Brings the people together; makes business better in every way; in fact, something we must have.

The new service is all that could be desired.

We get respectful attention from Ontario Telephone Company, which we never did from the Bell.

We were always treated civilly, but we get favors now that we never dared ask for before.

The improvement has been very marked.

Answers to the fourth question, "Have rates for telephone service been reduced by the advent of competition," and the first subdivision of question four, "By the establishment of rates by the Independent company lower than formerly prevailed?" are as follows:

From $4.00 to $1.50 per month.

Yes, almost two-thirds of what they formerly were.

They are now about one-half former rates.

I now pay $36; used to pay $60.

Yes, the Bell company rates when it had 100 subscribers were $60 per annum, while the local company established a $36 rate.

Yes, less than half the former rate. Cut the Bell rate in two and have maintained it ever since and make a fair rate on the investment.

Reduced fifty per cent and service extended from about 100 to 3,000 free connections.

At date of organization, July 1, 1897, the Independent rates were $20 and $25 per year; two years ago were reduced to $1.50 and $2 per month, direct line.

The Independent company cut the telephone rates in two. The Bell company came to it. Then the Bell company began giving free telephones in the house where the Bell was at the office or store, providing the Independent telephone was removed.

The Bell company formerly charged $4 per month. When the new company started it charged $2 per month, and for a while did all the business. Afterwards the Bell company reduced its rate to $2 and subscribers gradually came back to the Bell telephones. The majority now have both telephones.

The Independent company furnishes service at lower rates than does the Bell company.

There has been no material reduction in Bell rates. Independent rates lower than Bell.

They are much lower and give better service than the Bell company.

The Bell company rates were $3 for business and $2.50 for residences, and on account of competition, as we understand, it was reduced fifty cents on residences, but no reduction on business houses.

Yes, we cut the rates about forty per cent. We should not have made so great a cut, as is now apparent, from the fact that our exchange is twice or three times larger than ever seemed possible when we commenced.

Yes, the rates by the Independent company are two-thirds former rates, and as regards service and greater civility, there is no comparison.

Bell rate for business houses $3 and residence $2 and $2.50 per month, with unsatisfactory service. Creston mutual rates for business houses, $2, and residence, $1 per month.

Rates established by Independent lower than former rates by about 33 1-3 per cent, which is adhered to without change.

Previous to the construction of our Independent exchange we only had a Bell toll station and paid twenty-five cents per message from here to Cleveland. Since we have begun operating the rate has been reduced to 10 cents, same as ours. My experience with the Bell people is that they control things until they have competition, and then they try to crush all competitors.

Before the Citizens' Telephone Company began business we were charged about fifty per cent more for long-distance service by the Bell than now. The Bell people have only the long-distance service, and are pay stations.

A reduction in rates with better service by the Independent company has practically put the Bell company out of business here.

Yes, it is now on a living basis for all.

We have a thousand or more now at $2 per month each, and when we had one telephone company with 75 subscribers it was $4 per month.

Each company has reduced its rates. Where we had to pay only $36 for one telephone, we now pay $48 for the two, as it has been necessary for us to have both, so you see the benefit comes in the reduction of rates in residence telephones, and as a result the increase in the number of subscribers.

Yes, two telephones cost less in many cases than the Bell company charged when it had a monopoly here.

Yes, from $72 per year paid the Bell company for one telephone service to $40 for equal service by the Independent line.

Subdivision two of question four, "By the reduction of Bell rates formerly charged?" brought these replies:

The Bell monopoly was forced to meet the Independent rate.

Yes, after I had a local telephone I was offered a Bell telephone first for $24, then $18, then for $12, and finally free of charge.

Bell is almost out of business.

The Bell company followed reduction made by Independent companies.

Yes; that is, the Bell rates were reduced when the Independent company proposed to establish here.

In our city the Bell company was unable to establish an exchange on account of the high prices charged by it for service. The Independent put in an exchange about two years ago and it covers the

ground so completely and its prices are so reasonable that the Bell is now unable to get many patrons at prices 33 1-3 less than the Independent.

All those that must have the Bell are paying the old price, but where it tries to drive out the Independent it is putting in telephones at any price.

Yes. Bell rate dropped from $4 per month to $1.50.

Bell company gave two years' service free of any charge to drive us out of business, but are now back to its original price, which is about forty cents above us. We should have adopted a sliding scale so as to have been able to change.

It would not. The service is within reach of all. Before Independent came in it was very dictatorial.

Bell company put in telephones for months free and is charging less than half the price before mutual was started.

The ruinous cut in rates by the Bell company did not affect the Independent company.

Yes, reduced rates to kill the Independent company, but failed.

For year or two after advent of Independent company Bell rates were almost nominal; now advanced.

Bell offered services for nothing for years, but is now charging less than formerly.

The Bell company for a long time had no regular rates. Later it made a rate equal to about one-third to one-half its former rate before there was competition, but is doing very little business locally. Our people are very loyal to the Independent company.

The Bell company gradually lost ground and finally gave up the local service.

The Bell company cuts rates wherever it can procure a customer.

Bell rates vary. Wanted to leave in our store for nothing several months. Had to cut wire to get it out.

Yes, we have the service of both companies at less price than we formerly paid for the Bell.

The Bell company met the rates of the Independent and in some cases put telephones in for nothing.

The Bell people gave the party line rate at the start of the competition and give almost any old rate to get patronage.

Bell rates were demoralized when new telephones started and continue so.

By compulsion to hold the small list of subscribers.

Do not know, as I have ordered Bell out, as the new company has nearly every subscriber in town.

I do not know Bell present prices. It has so few on its list that any charge would be too high.

Yes. In many instances both services are had for less than former Bell rates.

Bell telephones have all kinds of rates. No uniformity. Here it has not reduced its rates, except where necessary to hold business.

The following are answers to the fifth question, "In your judgment would it be preferable to return to the conditions prevailing before the advent of the Independent company?":

By no means. It keeps the Bell company busy to treat its patrons with common courtesy with competition.

No, I do not believe any business or private individual in Johnston would for a moment think of choosing the old conditions.

No. If the Bell should at any time buy out the local company another would be started in a day.

Not by any means. Active, live competition is necessary in the telephone business, for this insures the public reliable service and fair treatment.

Legitimate competition is beneficial in all lines of business, and what is true in other lines of trade is no doubt true of the telephone business. No, no, unless a cheaper and better service, which I do not think would result with only one company.

My opinion is that were the Independent company to go out of business and no other were to take up the business, citizens would build a system, not necessarily for an investment, but for their own protection.

No; never, never.

Opposition has made the telephone system of this district what it is to-day, the best in the country. Without opposition we would be where we were ten years ago and would be still paying $4 per month.

No. I only wish that the Independent company had come sooner.

No, it certainly would not. The service prior to the advent of the new company was very bad.

Of course two systems are a nuisance, but we would not return to the old system for anything. Three-fourths of our business comes over the Independent lines.

No. We can now talk to over 2,000 subscribers. With the Bell company we never had over 600.

No. We can now have both telephones for less than we formerly paid for Bell alone, and about 1,500 connections where we had about 200.

By no means, because it was then little short of impossible to secure good service.

When it becomes preferable to hire an uninterested party to attend to your wants, rather than do it yourself, then it would be better to have the Bell back. We have the finest system on earth, and the most harmony, good will and success. Put in an Independent by all means.

Positively no. We would rather discontinue the use of the telephone than again be subject to the conditions that prevailed prior to the coming of the Independent company.

Not in my judgment, as the management and service is all that could be desired, and it is a pleasure for me to say that day or night the service is O. K.

No, these conditions were then insupportable and would now be impossible. The public can stand a lot, but not that.

No, never. No; could dispense with the Bell if it was not for the long distance connections.

No. The Independent movement is the greatest thing for the people.

Under no circumstances, real or imaginary, the Bell people being minus of friends, their method to gouge the people all they can, with no regard for service or accommodations.

Not much. It was a "Russian" form of corporation.

No, never. The more telephones the more business, for you can reach more customers. People that say two telephones are a nuisance will say that two customers are a bother.

Such a condition would not be brought about. The Independent company serves about four times as many homes and houses as the old, and the convenience is very great.

Service is better on the new. Expenses reduced. Would prefer one line to two if service could be as good as new line.

While I think two instruments in an office is somewhat confusing, I would consider the absorption of either by the other a misfortune.

My opinion is that competition improves any service, but I think the improvement is emphasized in the telephone business, as the service is improved both in promptness and courtesy.

Never. "The battle cries that led the hosts to victory are to-day but watch words of the sluggard and the slave."

Decidedly and emphatically no.

I think not. The Independent company has done a fine thing for this part of the country and deserves great credit for it, and it should be patronized before any other company.

No, sir, not by any means. Had the Bell company been decent and put its rates at a living price, the Independent company would never have been established here.

Could not think of submitting to former conditions.

No, for rates would go up and not more than half the people could afford a telephone.

No, but one company would be preferable to two, if the service was first-class and the rates charged were reasonable. Under the old conditions the Bell company had a monopoly and abused it, charging exorbitant rates for poor service. Under the new conditions its service has improved, but it has been brought about solely by the Independent company.

Rather have no exchange at all than return to old conditions.

Not by any means return to old conditions. It would deprive hundreds of citizens of the convenience of the use of a telephone.

Under no circumstances, unless the Bell company could be bound beyond question to give the best service at the lowest rates now in force, or practically one-half the rates it charged before competition.

There would be nothing that could be called telephone service if it was left to the Bell company here.

No, the present is 200 per cent better than the monopoly of the Bell company.

By no means, the service of the Independent company is so much better that we would rather see the Bell company drop out rather than the Independent.

Under no circumstances. The service is as good as it was under the Bell regime, and the new, or Independent company has three telephones in where the Bell has one, and is connected up with every village in the county.

No. It necessitates having both telephones to reach all the people. We would not like to go back to the old conditions.

The advent of Independent telephones has been a source of congratulation to the citizens and business men of this city. They have brought business to the city that never reached us before, and we earnestly hope that we may never have to return to the conditions prevailing before the advent of the Independent companies.

No. While we have to pay about one-half more in rates to maintain both telephones, we do three times the business by telephone that we formerly did.

It would not be preferable. It would be a calamity.

Not at all. Would sooner have telephone removed.

Such a showing at this time is extremely gratifying to the Independent operator. It is a pleasure to know that the work undertaken in a new field has proven fruitful, and given the people of the United States a telephone service little dreamed of previous to the advent of Independent telephony.

The Independent movement has been gaining ground

rapidly, and, with the first three or four years of its onward march it has outstripped all estimates with regard to its aftergrowth and impressiveness. The 1,400 telephone users, who have so approvingly expressed their sentiments, unquestionably voice the feeling made manifest throughout the land, and which has built up a competition against the Bell monopoly of influence, vast possibilities and benefits to the public. The replies which are tabulated herein are not secured from people who are furnished with free telephone service, nor are they solicited among subscribers who are local stockholders in Independent exchanges. The evidence is secured generally from among telephone subscribers without regard to their interests, other than that which deals purely with the benefits accruing to them from competition in telephone business, and surely the mass of evidence presented is not only remarkable, but overwhelming in its general tone, strengthening, as it does, in every way, the claims which the Independent operator has advanced from the beginning of the movement, and, in looking over the field to-day, it may truly be said that victory has crowned the efforts of the worker in the Independent telephone field, and he may justly be proud of the fight which has brought so much good to the people of the country in a warfare waged against a monopoly of nearly twenty years' standing, strongly entrenched locally and encompassing in its immensity not only vast capital, but many of our strongest legal and conservative business men of the country. Well may the young fighter feel proud at the success which has crowned his efforts, and which to-day, at the expiration of ten years' fight, demonstrates the strength of his judgment at the beginning, and the result of his fight during the years past. The mistakes which have arisen in this fight were the natural results due to dealing with a problem of which little could be known because of the methods pursued by the monopoly in earlier years, which precluded the possibility of a more general use of the telephone in all walks of life.

BY-LAWS NORTHWEST IOWA TOLL LINE ASSOCIATION.

The object of the association is to maintain a common standard of construction of toll line and to maintain a mutual exchange of business with each other and all other relations of mutual interest to each other.

The principal place of business shall be .....

The membership of the association shall consist of any individual person owning toll lines, and one person to represent any company or organization owning toll lines.

The association shall have two forms of voting.

First—Each member shall have one vote, known as the membership vote.

Second—Each member shall be entitled to one vote for every one hundred dollars' worth of toll line property he owns or represents (providing no one person can cast more than ten per cent of all the votes of the association). This shall be known as the association vote. All business of the association shall be transacted by the association vote, except as hereinafter provided for.

The association shall be governed and controlled by a board of five directors, of which the president shall be chairman. The other four shall be elected annually by the association from its members.

The duties of the board of directors shall be to fix the valuation of all toll line property, and the number of votes each member is entitled to; to fix the standard of all toll line construction; to see that all toll lines are brought to the highest standard of working order consistent with the needs and condition of each individual line, and all other duties pertaining to the successful management of the association.

The association shall also elect at each annual meeting a board of arbitration. Said board shall have five members and shall be elected as follows: Three shall be elected by a membership vote and two by the association vote.

The duties of the board of arbitration shall be to settle all questions of appeal from the action of the board of directors, and the decision of said board of arbitration shall be final. Any member of the association can appeal any act of the directors to the board of arbitration. When an appeal is once taken from the directors to the board of arbitration the decision of the board of directors cannot be executed until the arbitration board has first acted, which may be done by a meeting of the full board of arbitration, or appointing one or more of their members to take evidence and decide.

The officers of the association shall consist of a president, vice-president, secretary and treasurer, and their duties shall be such as is common to these offices.

The expense of the association shall be borne by an assessment levied by the board of directors, on both the members and the association vote, but the aggregate assessments cannot exceed in any one year two dollars per member and twenty-five cents on each association vote.

All compensation for work done by the directors or the board of arbitration shall be fixed by the association.

These by-laws and regulations can only be changed by a two-thirds vote of both the membership vote and the association vote, after a notice of the change desired has been given at one regular meeting previous to the one in which action is taken.

The above by-laws and rules of this association are binding on each and every person, company or organization joining this association, from the time they become a member of the same until Jan. 1, 1914, providing any person or company can withdraw from this association with all the claims it has upon them by giving the president and secretary three years' notice in writing of their desire so to do and paying into the treasury at the time notice is given $2 for every association vote they represent. The said money, when paid in, shall become funds of the association and may be used for paying the expenses.

I hereby agree, in becoming a member of this association, that I will give to each member of the same the free use of all my toll line controlled by me or the company I represent for the transaction of telephone toll line business. That I will keep my lines in good working order and bring them up to common standard of construction, as agreed upon by the board of directors, or, failing so to do, I will allow the association to do the same with all other improvements they deem necessary, and will turn over all my toll line receipts to said association until the same is paid for in full.

And I will abide by all the rules and regulations of the association as fixed in the by-laws so long as I remain a member of the same.

The first telephone line erected in Vincennes, Indiana, was in 1874, and was strung from the office of Thomas R. Cobb, in the postoffice building, to the office of Dr. F. W. Beard, in the Gas company building. Although the line was only a string and the receivers trumpet-shaped newspapers, conversation between the two offices could be distinctly heard.

If there is any one thing that a Kiowa Indian likes better than wo-haw it is to talk over the telephone. The Indian agent's office at Anadarko frequently has business with the Indians who live near this place and call for them to come to the telephone. It is only necessary to make it known that an Indian is wanted at the telephone and there is a rush to see who can get there first. While one talks the others stand and listen, seeming to enjoy the novelty of talking to a friend twenty-four miles away. The only wonder is that the telephone can carry the Kiowa jargon at all, for it is the hardest, most unintelligent Indian tongue spoken. It has no euphony and is as impossible for a white man to learn as it is to learn the Chinese language.

The World's Telephone Rates.

F. DAGGER

PART III.

Australia (Pop., 3,800,000).—The telephone service in Australia is owned and operated by the government, and prior to the establishment of the commonwealth, each colony controlled its own system. The most progressive colony in the matter of telephone service is New South Wales, which, in 1901, had 10,119 telephones, including private lines and extensions. The system at that date comprised one central exchange at Sydney and twenty-three suburban exchanges with 6,694 telephones.

The central exchange at Sydney was connected with the suburban exchanges by 118 incoming and 71 outgoing junction wires; in addition to which there were fifty junctions between the various suburban exchanges.

Outside Sydney and its suburbs there were fourteen country exchanges, having a total of 862 subscribers. Later statistics place the number of telephones on the Sydney system at 9,000, with a population of 383,500. The rates in New South Wales are: Business, $48.70, and residence, $24.35 per annum; beyond a distance of one mile, the rental is increased by $4.87 for each additional 440 yards.

The other important exchanges in Australia are Melbourne, which has 5,000 subscribers, with a population of 491,000; and Adelaide, which has 2,000 telephones, and 163,430 inhabitants. The rates in Melbourne and Adelaide are the same as those of Sydney. The rates in other parts of Australia are. South Australia: Business, $48.70; residence, $24.35 per annum; beyond the first mile an additional rental of $4.87 for each 440 yards is charged. Queensland: $29.22 per annum for the first half mile, and $6.09 per annum for each additional half mile. Tasmania: For the first quarter of a mile, business, $29.22; residence, $21.92; and $2.44 per annum for each additional 440 yards.

There is at present a very limited long distance service in Australia, the most important lines being as follows: Sydney to Bathurst, 155 miles; Melbourne to Bendigo, 100 miles, and Brisbane to Watwick, 155 miles.

In 1901 a committee consisting of the deputy postmaster general and the chief electricians of New South Wales, Victoria and Queensland was appointed by the Australian posts and telegraph department to investigate and report upon the telephone service of the various states of the commonwealth, with a view to formulating a scheme for the reorganization of the systems on a basis which would ensure a better, cheaper and more universal service for the people.

The subject of telephone rates formed a most important part of the inquiry, the result being that the committee decided to recommend the adoption of the measured rate system of charging on the following basis:

FIXED RATES PER ANNUM TO INCLUDE 300 CALLS.

Under 5,000 telephones	$22.50
5,000 to 20,000 telephones	$25.00
Over 20,000 telephones	$30.00

ADDITIONAL TOLL RATES OVER 300 CALLS.

Up to 1,000 calls	2 cents per call
1,000 to 5,000 calls	1 cent per call
Over 5,000 calls	½ cent per call

The average number of calls per subscriber, per day, in Melbourne and Sydney, is thirteen. Taking this average as a basis for calculating the cost of service in these cities under the proposed new scale, the following result is obtained:

300 calls per annum cost	$25.00
3,600 extra calls at 1c	36.00
Total average annual cost per subscriber	$61.00

Many subscribers' daily calls greatly exceed the average, some of them making from 100 to 150 calls per day, therefore it is difficult to understand how subscribers will obtain any advantage, under the proposed system of charging, over the existing flat rates. It will also be noticed that the difference of $2.50 between exchanges of over 5,000 subscribers and those below that number, is too small to offer much inducement for the establishment of small systems.

The result of the investigation tends to show that the telephone service generally was both inefficient and inadequate to meet the requirements of the public. In fact the only service which was in any way up-to-date was that of Sydney, where the central equipment was only eighteen months old, as a result of which that city has nearly two telephones to every one in the larger city of Melbourne.

With a view to bringing the telephone service of the commonwealth up to the required standard the committee in its report made the following recommendations:

1. The complete rebuilding of the exchange at Melbourne and the partial reconstruction of the Sydney and Adelaide systems, at the following estimated cost:

	Melbourne.	Sydney.	Adelaide.
Central office equipment	$ 235,000	$234,000	.....
Subscribers' telephones	120,000	.....	.....
Conduits, cables, etc	777,000	186,000	.....
Suburban exchange equipments	.....	45,000	.....
Total	$1,132,000	$465,000	$450,000

It is proposed that these expenditures shall be spread over a period of three years. The adoption of the common battery system on all central office equipments of over 2,000 lines, and of the bridging system on all small exchanges, is also recommended.

2. The construction of a long-distance line, consisting of copper wire, weighing 600 pounds per mile, between Melbourne and Sydney, a distance of 625 miles, at a cost of $250,000. The revenue at the proposed rate of $1.62 per conversation of three minutes' duration, is estimated at $17,060 per annum, and the working expenses at $13,250, leaving a profit of $3,810.

Referring to the report of the committee, the following statement was made in a recent issue of a Sydney paper:

"The Postmaster General is considering the establishment of uniform telephone charges for uniform service in all the states. Sir Phillip Fysh hopes to be able to reduce the charges in some of the states without loss of revenue, but thinks it will be ill advised to make any specific promises until the Cabinet has been consulted. Having received reports from America on the successful working of automatic switchboards, the Postmaster General is having an estimate prepared of the cost of one for fifty telephone subscribers in the commonwealth. It will be built as an experiment, and if successful will be generally adopted. The government has abandoned for the present its intended appointment of an electrical expert from England or America to advise in connection with the telephone and telegraph systems. Sir Phillip Fysh recognizes the advantages that would accrue if the systems were placed on a uniform and up-to-date basis, but the amount of money involved in doing this would run into many thousands of pounds, not at present available. The proposed appointment has been postponed indefinitely, or until Parliament provides a loan for the purpose of carrying out metallic circuits and other improvements."

A survey of the telephone situation in Australia leads one to the inevitable conclusion that the public would have been served much better, had the local systems been operated by local Independent companies, or municipalities. It cannot be claimed that government ownership of the telephone exchanges in Australia has been a success, but on the contrary the result proves that, compared with other countries where

the service is in the hands of private enterprise and unhampered by monopolistic rule, the development has been amazingly slow, the systems are obsolete, and entirely inadequate to meet the public requirements.

New Zealand.—The telephone service of this colony is also owned and operated by the government. On March 31, last, the system comprised twenty-six exchanges, forty-four suburban exchanges, 10,633 subscribers, and 8,727 miles of wire, with a population of 797,000.

The rates for service are: Business, $34 per annum for distances up to half a mile, with a further charge of $2.43 per annum for each additional one-quarter mile up to three miles; residence, $24.35 per annum for distances up to one mile; beyond, $2.43 per annum for each additional one-quarter mile. The business rate of $34 is only charged in those towns where a continuous day and night service is provided. When we take into consideration the remote position of this colony and the distance from the manufacturing countries from which the necessary materials are imported, together with the cost of labor, the charges for telephone service are very moderate and in striking contrast with the rates in operation in other countries where the facilities for establishing and maintaining telephone systems are much more favorable.

It is also worthy of note that whereas the expenditure of the telegraph service exceeds the revenue, in the case of the telephone service, after providing five per cent interest on the capital outlay, the receipts and expenses balance. Also that out of a total telegraph and telephone revenue of $900,000 the telephone receipts amounted to $200,000.

Japan.—The Japanese government own and control the telephone service. The rates charged vary from $23.00 per annum to $31.60. In 1902 the total number of telephones in operation in Japan was 19,000, distributed as follows: Tokio (population, 1,500,000), 5,000; Yokohama (population, 194,000), 3,500; Kobe (population, 220,000), 1,500. The balance were divided among about a dozen other exchanges. The following are the principal long-distance lines: Tokio to Kobe, 377 miles; Yokohama to Kobe, 377 miles; Tokio to Osaka, 360 miles; Kobe to Nagoya, 161 miles. The long-distance charges are twenty cents per fifty miles for each conversation of five minutes' duration.

With a view of bringing the telephone into more general use the Japanese government has decided to spend within the next five years the sum of $2,400,000 in extensions. New exchanges are to be established at Tokaido, Kokura, Hakata, Kagoshima, Utsunomiya, Hirosaki and Okayama. Toll offices are also to be opened at about thirty other places. Independent telephone manufacturers in the United States ought to see that they secure a large share of this business, much of which has hitherto gone to the Western Electric Company.

Corea.—The government owns and operates the telephone systems in Seoul, the chief city. The exchange was opened in September, 1902. The rate charged is $50.00 per annum, plus an installation fee of $7.50. The public call office charge is twenty-five cents for conversations of five minutes' duration.

Summatra (Medan).—According to latest statistics this place has five exchanges, with 231 subscribers, at rates varying from $73 to $146 per annum.

Argentine Republic.—The telephone service in the Argentina is operated by an English enterprise, the River Plate Telephone Company, Limited, of London. The company serves a district in Buenos Ayres and suburbs having a population of nearly 1,000,000. Within this area there are twenty-four exchanges, aggregating 8,000 subscribers. The rates are: Business, $73.05 per annum; residence, $48.70 per annum. The company has recently established a complete central energy plant (Western Electric) in its main exchange, situated on the Avenida de Mayo. The central switchboard is equipped for 5,040 lines, in addition to 150 incoming and 150 outgoing junction lines, with an ultimate capacity of 10,000 lines. All wires have been placed underground, the conduit system comprising iron pipes of British manufacture and American vitrified multiple ducts. The instruments in Buenos Ayres are Western Electric manufacture. At Rosario, the second largest town in the Argentina, 200 miles from Buenos Ayres, there are 1,000 subscribers. The company has recently acquired the business of the Provincial Telephone Company, which has added fifteen exchanges and 750 subscribers to its system, which now comprises fifty working exchanges.

Venezuela.—The telephone service in this republic is operated by the Venezuela Telephone and Electric Appliance Company of London, England. According to the latest statistics it has eighteen exchanges, about 3,000 subscribers, and 455 miles of long-distance lines, including two miles of subways. The rates charged vary from $41.66 per annum to $38.71 per annum.

Barbadoes.—The latest statistics show the number of telephones on this island to be 520, the majority of which are in Bridgetown.

The total mileage of lines is 685, of which 650 miles are operated by a private company and thirty-five miles by the government. The rate charged to subscribers is $29.22 per annum, for which a continuous day and night service is provided.

Chili.—The telephone system in Chili is operated by a British company, the Chili Telephone Company of London, England. According to the company's last annual report, the number of subscribers was 5,371 and the average receipts per subscriber was $49.12. The largest exchange is at Santiago, where the company has recently installed a new multiple central office equipment. In consequence of several serious accidents from contact with trolley wires, the government has lately passed a bill for regulating electric services, which requires telephone and telegraph wires to be put underground. The company is therefore about to construct a conduit system.

Peru.—We are indebted to the British consul at Lima for the following information regarding the Peruvian telephone service:

Telephone networks exist in the departments of Lima, Piura, La Libertad, Arequipa and Ica. The total length of lines is over 3,000 miles. Moreover, a number of applications for further concessions to put up new installations have recently been made. During 1901 the Trujillo Telephone Company extended its lines to Ouizco, Huamachuco and Cyabamba; in all about 300 miles. Great difficulty was experienced at first, on account of the electric storms that arise in those mountainous districts, but these disturbances have been overcome and communication is both safe and constant. What was at first regarded with terror is now in continual demand.

In 1902 Peru was connected with Ecuador by the completion of a long distance line from Talara to Zarumilla on the frontier of the latter country. The line from Lima has been extended beyond Oroya. Casma has been connected with Huaraz and Pucara with Azangaro. It is now under consideration to connect Huanuco with Sullana via Huancabamba.

The local telephone company at Trujillo has amalgamated with the company established at Pacasmayo and the joint companies' systems now extend from Salaverry to Guadalupe. There are about 300 subscribers to the Trujillo-Pacasmayo service.

A new company has recently been formed (the Compania Telefonica Tresandina) whose lines serve the districts from Trujillo, Otuzco, Santiago de Huamachuco, Cajabamba, and all the sugar estates and mines of importance in these districts. The Tresandina company has only thirty-two subscribers but it operates over 328 miles of lines.

The British consul reports that most of telephone appliances come from Sweden. Only very small orders have been

placed with the United Kingdom, the reason given being that the instruments and appliances made by British manufacturers are quite unsuitable for use in this country and the consul states that "inasmuch as the demand for telephone apparatus must in the near future become very large in South America, this branch of industry may be deserving of more attention than it appears to receive at present in the United Kingdom." This fact is also worthy of note by the Independent manufacturers of the United States.

Brazil.—This country offers a good field for the promotion of new telephone enterprises, as there are no telephone systems of any account in operation here, at the present time. Rio Janeiro (Pop. 522,700) is without a service, although the government at present is negotiating for the establishment of an exchange by a private company. It is reported that an Anglo-French company, with a capital of $1,250,000 has recently been formed to exploit a concession in the state of Rio Janeiro.

India, China and Egypt.—The telephone service in these countries is provided by the Oriental Telephone and Electric Company, Limited, of London, England, and its subsidiary companies; the Bombay Telephone Company; the Bengal Telephone Company; the China and Japan Telephone Company; and Telephone Company of Egypt.

In India the company has recently obtained from the government an extension of its licenses for a period of sixty years; the state reserving the right to purchase the undertakings after the expiring of twenty years, or at subsequent periods thereto.

In Egypt the company has exchanges at Cairo and Alexandria, where it is constructing an underground conduit system. It is also connecting a number of the villages in the provinces of Lower Egypt, under agreement with the government.

The government of Egypt is at present building a long distance line between Cairo and Alexandria and will have it working this year. It is the intention of the state to lease these lines to the Telephone Company of Egypt.

In a later article the writer hopes to be able to give more detailed information regarding the telephone systems of these countries.

A SUCCESSFUL RURAL SYSTEM.

In Kosciusko county, Indiana, at Milford, about a year ago was organized an Independent telephone company, and on last New Year's morning it commenced giving service to about fifty subscribers. This number was soon increased to a hundred, and within four months was near two hundred. Milford has about one thousand inhabitants, and as the new company built farmers' lines in all directions and connected over toll lines to all surrounding towns, many of the old subscribers changed from the Bell to the Independent companies. Thus while the new company was rapidly growing, the old was as surely declining, and its subscribers so completely deserted it that there were but a couple of dozen left. Recently the Bell exchange, which a year ago had about a hundred subscribers, was discontinued. The new company is incorporated as the Royal Telephone Company and was organized by its present manager, L. M. Neher.

The Royal Telephone Company now has about 250 subscribers and expects to have 300 by the end of its first year.

All subscribers have free service over its lines and exchanges at New Paris, Millersburg, Oswego, Hastings, Leesburg and Milford, and a five-cent rate to the county seat, Warsaw. Arrangements have also been completed for a ten-cent rate to all other parts of the county. The company has built five toll lines and has long distance connections in every direction.

The rapid growth of this company may be attributed to two things. First, farmers in every direction were connected to the exchange, and, second, special inducements were made to secure the best citizens and farmers as stockholders in the company. This was accomplished in this way: The rental rate of telephones is $1.00 per month, but to everyone taking one share of stock a half rate is allowed, so that stockholders pay but $6.00 per year for service which costs others $12.00.

Mr. Nehr claims to be the originator of this idea, and it has certainly been a good one, for it brought in abundant local capital and gave the company such strength and influence that the Bell exchange of about 100 subscribers, as has been previously stated, was reduced to a toll station in less than a year.

As a rule about ten subscribers are placed on a line in the country, using the best bridging instruments with 1,600 ohms.

The telephones are so constructed that any subscriber can call any other on his line without calling central, and on the other hand any subscriber can call central without calling any other on the line. The party line rings do not come in to central. Private lines are supplied to all subscribers in town. To any subscriber using two telephones in town, an extra advantage is given in the way of a private line between the two instruments, over which calls may be made without the assistance or knowledge of central. The company has nineteen of these private lines installed. It is now building a toll line from Milford through Leesburg and Oswego to North Webster, a distance of sixteen miles.

NEW TELEPHONE PROBLEM.

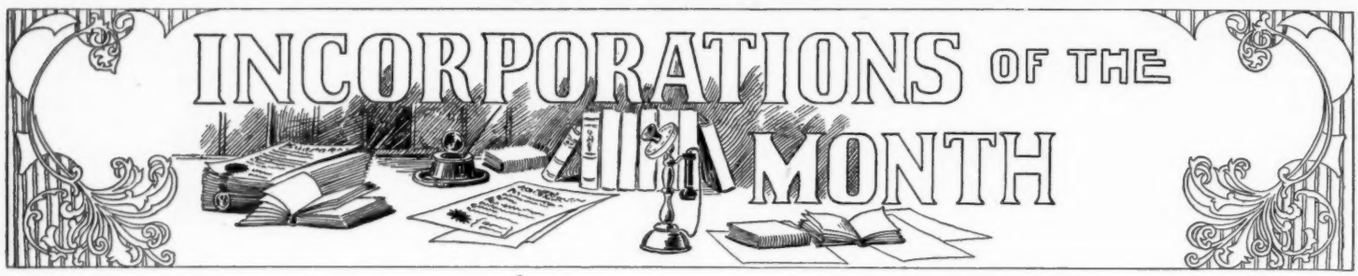
The number of telephones in use in recent years has increased enormously, and this increase has resulted in a problem concerning the reduction of the two greatest items of expense in the telephone service, i. e., cost of operators and cost of exchange construction. The first item, embracing the wages of 35,000 operators, is, in the United States, over $10,500,000 annually, while the second item, that of construction and renewal of exchanges, represents an annual outlay of $35,000,000.

Up to about nine years ago there were only 50,000 Bell telephones in use. In the meantime both Bell and Independent companies have increased that number over 500,000 telephones a year, so that there are in use to-day five million telephones, and the rate of increase is advancing. The yearly outlay for the item of salaries alone would pay five per cent per annum on an investment of $200,000,000.

The present multiple switchboard is a delicate instrument and the item of wear and tear is from ten to twelve per cent annually, requiring new switching apparatus for at least 450,000 telephones. New subscribers are increasing at the rate of about 600,000 more, annually, making a total new demand annually of switching apparatus for about 1,000,000 telephones.

The majority of the Independent telephone companies (numbering about 700) are known to be in immediate need of new switchboards, as the first installations are nearly worn out, so that for both Independent and Bell manufacturing companies it is going to be a problem to supply new switching apparatus for renewals and new installations. Indications point to the most prosperous future for the telephone industry.

The noticeable improvement in the advertising, technical and advanced instructions given in TELEPHONY makes it a journal worthy of a place in any engineer's home or library of the profession. The liberal policy being employed by you already assures the success of TELEPHONY for another year. —Robert H. Leather, Philadelphia.



Farmers' Telephone Company, Amboy, Ill.

Benson Telephone Company, Benson, N. C.

Galway Telephone Company, Galway, N. Y.

Farmers' Telephone Company, Stockholm, Minn.

Yanceyville Telephone Company, Yanceyville, N. C.

Clinton and Garland Telephone Company, Norfolk, Va.

Charles Mix County Telephone Company, Platte, S. D.

Liberty Telephone Company, Liberty, Ind. Capital stock $30,000.

Venters Telephone Company, Elkhorn, Ky. Capital stock $7,000.

North Grundy Telephone Company, Grundy Center, Ia., organized.

Galey Local Telephone Company, Carnegie, Pa. Capital stock $5,000.

South Dover Telephone Company, Adrian, Mich. Capital stock $1,000.

Monroe Mutual Telephone Company, Paris, Mo. Capital stock $4,500.

Prentice Telephone Company, Prentice, Wis. Capital stock $5,000.

Delaware Valley Telephone Commpany, Narrowsburg, N. Y., organized.

Gratiot County Telephone and Messenger Company, Alma, Mich., organized.

Yellowstone Park Telephone and Telegraph Company, Livingstont, Mont.

Monroe Independent Telephone Company, Monroe, Nebr. Capital stock $5,000.

Northern Lackawanna Telephone Company, Fleetville, Pa. Capital stock $5,000.

Western Grove Telephone Company, Western Grove, Ark. Capital stock $25,000.

Home Telephone and Telegraph Company, Raleigh, N. C. Capital stock $500,000.

Munith and Grass Lake Telephone Company, Munith, Mich. Capital stock $2,500.

Northwestern Telephone Company of Seneca, Canandaigua, Mich. Capital stock $1,400.

Northern Antelope County Telephone Company, Neligh, Nebr. Capital stock $50,000.

Shell Prairie Telephone Company, Park Rapids, Minn., organized. Capital stock $10,000.

La Bonte Telephone Company, Cripple Creek, Colo., organized. Capital stock $25,000.

Skagit Farmers' Mutual Telephone Company, Stanwood, Wash. Capital stock $200,000.

Libertyville Telephone Association of Vigo County, Libertyville, Ind. Capital stock $500.

Ashley Wireless Telephone and Telegraph Company, Pierre, S. D. Capital stock $1,000,000.

Sioux City Telephone Company, Sioux City, Ia. Capital stock $10,000. H. Woodruff, incorporator.

Lykins Telephone Company, Lykins, Ky. Capital stock $8,000. Incorporators, John R. Lykins and others.

Holton and Osgood Telephone Company, Osgood, Ind. President, Philip Smith; secretary, Harvey Crouch.

Farmers' Telephone Company, Kempton, Ill. Directors, Joe Broadbent, Fred Woldschmidt, Ellsworth Cook.

Lamsburg Telephone Company, Owosso, Mich. Capital stock $25,000. Incorporators, R. Simpson, J. L. Hisey.

Home Telephone Company, Santa Barbara, Calif. Incorporators, F. F. Graves, F. W. Wachter, D. F. Boyce and others.

Rib Lake Telephone Company, Rib Lake, Wis. Capital stock $5,000. Incorporators, F. J. Carr, C. B. Carr, A. E. Carr.

Danforth Telephone Company, Danforth, Me. Capital stock, $10,000. President, V. E. Price; treasurer, M. L. Porter.

Home Telephone Company, Virginia, Ill. Capital stock $10,000. Incorporators, Henry Goebel, C. E. Rexroat, C. D. Bayliss.

West Shore Telephone and Telegraph Company, Milwaukee, Wis. Capital stock $50,000. Incorporator, John W. Wegner.

Mendota-Benham Independent Telephone Company, Mendota, Va., organized. Capital stock $6,000. President, J. C. Prunor.

Burrows Telephone Company, Burrows, Ind. Capital stock $5,000. Incorporators, W. J. McNarry, W. West, O. N. Glasscock.

Livingston County Telephone Company, Chillicothe, Mo. Capital stock $2,000. Directors, S. J. Miller, A. M. Shelton, F. S. Miller.

Sullivan Telephone Company, Sullivan, Ind. Capital stock $50,000. Incorporators, John S. Bays, C. J. Sherman, Geo. A. Dalton.

Farmers' Mutual Telephone Company, Howe, Nebr. President, J. W. Mayer, Jr.; secretary, W. H. Lohr; treasurer, John T. Cox.

Dale Telephone Company, Dale, Calif. Capital stock $10,000. Incorporators, H. H. Ames, F. A. Reed, J. J. Ellerman and others.

Empire Construction Company, Santa Rosa, Calif. Capital stock $1,000,000. Incorporators, Senator W. A. Clark of Montana, and others.

Union Telephone Company, Mt. Carmel, Ind. Capital stock $10,000. Directors, J. R. Collins, W. B. Hood, Albert Krueger and others.

Champlain Telephone Company, Champlain, N. Y. Capital stock $2,000. Incorporators, W. O. Clark, T. H. Dickinson and Wm. Fraser.

Badger Farmers' Telephone Company, Milwaukee, Wis. Capital stock $10,000. Incorporators, John L. Fish, E. B. Atwell, Will G. Whitehead.

Hale Telephone Company, Hale, Mo. Capital stock $25,000. Incorporators, George H. Vaughan, J. R. Herriford, W. W. Deardoff and others.

Whiteplains and Red Hill Telephone Company, Whiteplains, Ky. Capital stock $150,000. Incorporators, W. L. Moore, B. F. Dukes and others.

Jackson Telephone Company, Boone, Ia. Capital stock $10,000. President, W. A. Will; secretary, W. S. Criswell; treasurer, Emanuel Nelson.

Southwestern Telephone Company, Frederic, Kans. Capital stock $15,000. Incorporators, J. T. Callahan, E. J. James, C. D. Kirkpatrick.

Williamson and Adjoining Counties Telephone Company, Carterville, Ill. Capital stock $2,450. Incorporators, James M. Crain, Jeff Cox, R. F. Martin.

Caledonia Telephone Company, Caledonia, Ohio. Capital stock $25,000. Incorporators, John Pommert, C. E. Kelly, T. J. Pittman, L. C. Donnenworth.

Seneca Castle Orleans Telephone Company, Shortsville, N. Y. Capital stock $5,000. Directors, R. B. Peck, W. C. Ellis, M. C. Ellis, W. H. Burke.

Swan Creek Telephone Company, Gallipolis, Ohio, organized. President, J. C. Lewis; vice-president, John Evans; secretary and treasurer, O. Hilvert.

Rich Valley Telephone and Telegraph Company, Medford, Okla., organized. President, W. Miller Smith; secretary, Milton White; treasurer, G. W. Trebo.

Maiden Rock and Esdaile Telephone Company, Maiden Rock, Wis., organized. President, Beverly White; secretary, Otto Holverson; treasurer, G. Bangton.

Masonville Telephone Company, Masonville, N. Y. Incorporators, L. L. Sornberger, D. C. Smith, W. E. Bogart, H. S. McKinnon, Merton Smith and others.

Spencer Telephone Company, Spencer, Ohio. Capital stock $5,000. Incorporators, Frank T. Cavin, N. E. Fuller, John Firestone, Minnie M. Freeman, C. S. Rice.

Finchford Mutual Telephone Company, Finchford, Ia. Capital stock $10,000. President, W. W. Plantz; vice-president, H. G. Miller; secretary, E. A. Evenson.

Currituck Telephone Company, Coinjock, N. C. Capital stock $10,000. Incorporators, E. R. Johnson, V. S. Crowell, Jay Scott, J. B. Garrenton, D. D. Newberry.

Patalaska and Hebron Telephone Company, Patalaska, Ohio. Capital stock $65,000. Incorporators, Dwight L. Sapp, Frank L.

Beam, Clayton H. Bishop, Robert M. Greer, C. Wesley Coe, C. Bonner, M. Allen.

Clearwater Telephone Company, Clearwater, Minn., organized. Capital stock $10,000. President, G. P. Bourwell; secretary, W. Frantzer; manager, J. H. Whitney.

Napoleon Telephone Company, Napoleon, Mo. Capital stock $5,000. Incorporators, J. M. Hutchins, H. F. Fellers, P. D. Williams, Adolph Bottein, J. A. Woestmeyer.

Wayne-Ontario Telephone Company, Ontario, N. Y. Capital stock $30,000. Directors, J. A. Driscoll, Rochester; L. T. Yeomans, Walworth; J. Seldom Brandt, Ontario.

Queen City Telephone Company, Cincinnati, Ohio. Capital stock $1,000,000. Incorporators, George W. Beers, Harry B. Gates, Max Silberberg, August Fabel, C. B. Wing.

Monrovia Telephone and Telegraph Company, Monrovia, Calif. Capital stock $50,000. Incorporators, D. E. Juvinall, M. Juvinall, C. O. Monroe and George McLaughlin.

Plymouth Telephone Company, Plymouth, Nebr. Capital stock $10,000. Incorporators, Henry Heiliger, Fred Bockholdt, C. W. Harvey, James Wrigley, H. D. Gerhardt.

Deer Creek Mutual Telephone Company, Independence, Okla. Capital stock $65,000. Incorporators, W. R. Cooper, A. W. Brown, M. A. Bates, J. H. Wilmeth, George T. Gentry.

Millgrove-Neeleyville Telephone Company, Millgrove, Ohio, organized. President, James Singree; vice-president, B. F. Wells; secretary, J. W. Harper; treasurer, A. M. McIntire.

Blanchard Telephone Company, Blanchard, Ia. Capital stock $3,000. President, W. S. Farquhar; vice-president, C. D. Johnson; secretary, O. C. Wetmore; treasurer, Frank Hooker.

Pitkin Telephone Company, Pitkin, Colo. Capital stock $10,000. Directors, Scott Dickinson, John Pinson, W. S. Henderson, D. C. Masson, W. Heckhert, John Custed, Thos. Huxtable.

New Long Distance Telephone Company, Texarkana, Ark. Capital stock $200,000. Incorporators, John B. King, Jos. Huckins, Texarkana; W. P. Harrison, F. Murrull, F. R. Harrison, Ohio.

Lauderdale Telephone Company, Ripley, Tenn. Capital stock $1,500. Incorporators, T. A. Anthony, W. G. L. Rice, L. C. Moorer, F. L. Spright, J. A. Holmes, E. R. Anthony, A. S. Anthony.

Barrington and Wayne Telephone Company, Dundee, N. Y. Directors, Charles Hauck, Cyrus A. Lawrence, Joel Lewis, Samuel Loomis, Olney Walker, Herbert Overshite, William Crosby.

Blanchardville and Hollendale Telephone Company, Blanchardville, Wis. Capital stock $1,000. Incorporators, Andrew Doran, Michael Cleary, John Wehren, Samuel Larson, Martin Larson.

Home Telegraph and Telephone Company, Henderson, N. C. Capital stock $500,000. Incorporators, W. T. Gentry, D. I. Carson, J. W. Crews, Hunt Chipley, J. P. Taylor, J. D. Cooper, F. C. Toepleman.

Farmers' Telephone Company of Lee County, Franklin Grove, Ill. Capital stock $25,000. President, A. W. Crawford; vice-president, George W. Schafer; treasurer, Christian Gross; secretary, John C. Hunt.

Dundee and Tyrone Telephone Company, Dundee, N. Y. President, Eugene U. Bigelow; vice-president, Fred Kendall; secretary, T. N. Howell; treasurer, Philander S. LaFavor; general manager, Frank Yost.

Northeast Telephone Company, Sulphur Springs, Tex. Capital stock $50,000. Incorporators, R. C. Hawley, James F. Quinn, Luther A. McLemore, John D. Williams, Sulphur Springs; J. J. Ellers, Pittsburg, Tex.

WIRELESS TELEGRAPH PROTOCOL.

The final protocol of the international wireless telegraph conference held in Berlin in August was recently made public by the state department. Gen. Greely was chairman of the American commission. This commission had no authority to make any binding agreement for the United States, but the protocol embodies in most of the essential features the views expressed by the American commissioners. Another conference will be held, and if all delegates have full powers the protocol will no doubt be embodied in a treaty for the government of international wireless telegraph communication. The following is the text of the protocol:

ARTICLE I.

The exchange of correspondence between vessels at sea and wireless coast stations open to the general telegraphic service is subject to the following conditions:

1. Any fixed station whose field of action extends to the sea is styled "coast station."

2. Coast stations are bound to receive and transmit telegrams originating from or intended for vessels at sea without any distinction of wireless telegraph system used by the latter.

3. The contracting parties publish from technical information likely to facilitate or expedite communications between coast stations and ships at sea. However, each one of the contracting governments may authorize the stations established on its territory, under such conditions as it may see fit, to make use of several installations or special arrangements.

4. The contracting parties state and declare they adopt for the fixing of tariffs applicable to telegraphic exchange between vessels at sea and the international telegraphic system the following basis:

The total tax to collect for such traffic is fixed by the words it includes; (a) The tax appertaining to the traffic of the line of the telegraphic system, the amount is that fixed by the international telegraphic regulations now in existence appended to the St. Petersburg convention; (b) The tax appertaining to the maritime course. The latter is, as the first one, fixed according to the number of words, and such number of words being reckoned in accordance with the international telegraphic regulations mentioned in paragraph "a" above.

It includes, first, a tax styled "coast tax," which belongs to the said station; second, a tax called "vessel tax," which belongs to the post established on the ship. A coast station tax is subject to the approval of the state on whose territory the station is established, and a vessel tax on the approval of the state whose flag is borne by the vessel. Each one of these two taxes is to be fixed on the basis of an equitable remuneration for the telegraphic work.

ARTICLE II.

Regulations which will be annexed to the convention that is to be perfected will establish the rules applicable to the exchange of communications between the posts and on board the vessels. The provisions of these regulations may be at any time modified by common understanding between the contracting states.

ARTICLE III.

The provisions of the telegraphic convention of St. Petersburg are applicable to the transmission of wireless telegraphy in so far as they do not conflict with those of the future conventions.

ARTICLE IV.

The wireless stations must, unless there should be absolute impossibility, accept in preference requests for help that may come from vessels.

ARTICLE V.

The service of wireless telegraph stations must be organized, as far as practicable, so as not to interfere with the service of other stations.

ARTICLE VI.

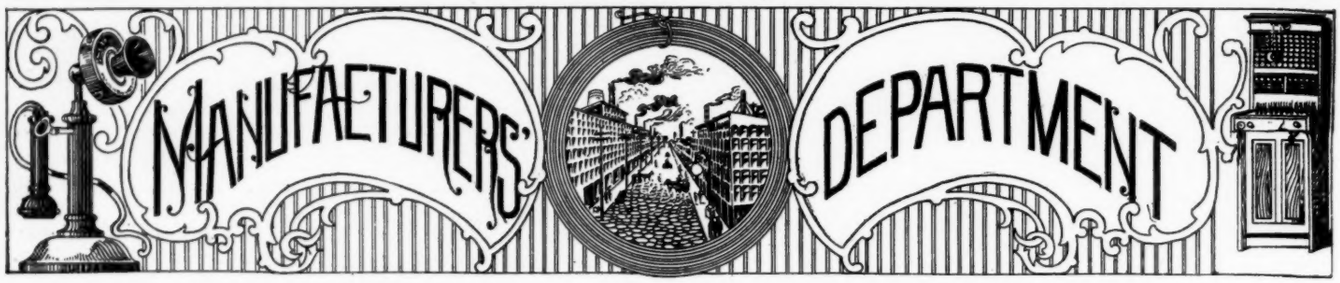
The contracting governments reserve the right to make separate arrangements for the purpose of compelling the contractors working within their territory wireless telegraph stations to obey only through other stations the modifications of the future convention.

ARTICLE VII.

The provisions of the future convention are not applicable to wireless telegraph stations that are not open to the general telegraphic service, except in regard to the clauses embodied in articles IV and V.

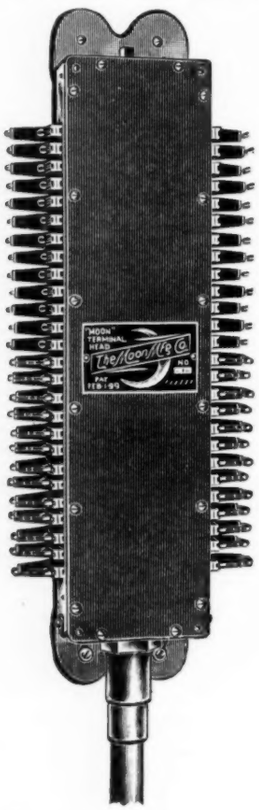
ARTICLE VIII.

The countries that have not adhered to the future convention may be admitted on their making a request to that effect.



MOON SELF-SOLDERING NOZZLE.

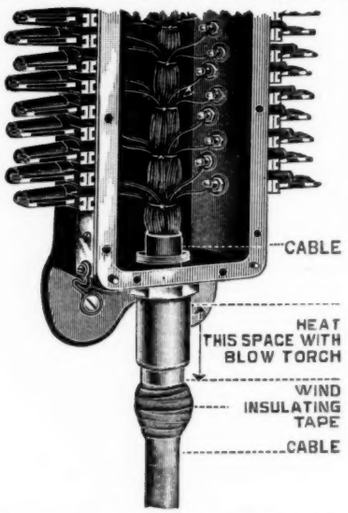
"A self-soldering nozzle" is the term applied by the Moon Manufacturing Company of Chicago to a new and simple device used with the Moon terminal head. By the use of a blow torch a perfect joint is formed, uniting the lead cable sheath and the nozzle of the terminal head as completely as though they were one solid metal. The nozzle has a recess on the inside which contains a quantity of solder. When the nozzle is heated by a blow torch the solder will melt and run down in the nozzle to a lower level, uniting with the lead cable sheath and the tinned inner surface of



MOON TERMINAL HEAD.

the nozzle, casting a solid joint, which is much more perfect and much stronger than a wipe joint. The nozzle is so constructed that a plumber's wipe joint may be made in the usual way if the wipe joint is preferred. With this nozzle either method of making the joint may be employed. A number of tests have been made with a joint thus formed. By cutting these joints into cross sections the result shows that the union of the metals is perfect and the space between the cable and the nozzle is completely filled. The metals are so firmly united that they appear like one solid piece. The nozzle contains an ample amount of solder which will fill the space between the nozzle and the cable sheath thoroughly.

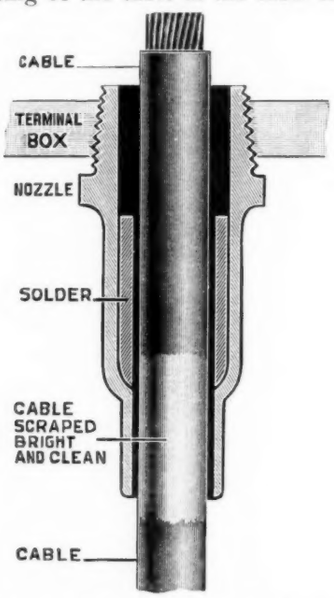
The Moon terminal head with self-soldering nozzle is easier to install than a pot head. The terminal head is first fastened in place upon the pole. The cable can then be connected up to it and the lead sheath of the cable sealed to



TERMINAL HEAD WITH SELF-SOLDERING NOZZLE.

the terminal head without removing the terminal head from the pole.

Before passing the cable end into the terminal head, strip off the lead casing of the cable at the cable end, leaving the



SELF-SOLDERING NOZZLE BEFORE JOINT IS FORMED.

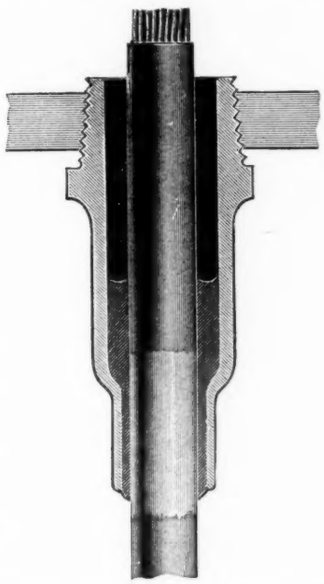
wires bare for connecting up to the terminal connections inside of the terminal head. Bind these wires with cord to prevent their spreading.

Mark off on the lead sheath of the cable the place where the joint with the nozzle is to be made. Scrape the lead sheath at this point until it is bright and clean. With a hot

soldering iron a thin coat of solder should then be spread over the place which has been scraped clean, using powdered resin, a tallow candle or a non-corrosive flux for flowing solder. The lead sheath of the cable is now prepared and the solder will readily unite with it. Pass the cable end up through the nozzle into the terminal head, permitting the lead sheath of the cable to extend into the terminal head about one-half inch. Then bind insulating tape around the lower end of the nozzle, lapping it over onto the cable. This closes the opening at the lower end of the nozzle, as shown in the cut, and prevents the solder running out.

Sprinkle a little resin or non-corrosive flux into the nozzle through the opening on the inside of the terminal head. Then apply the blow torch to the nozzle below the terminal head and heat it uniformly to a degree which will cause the sleeve of solder to melt and run down to a lower level in the nozzle.

The degree of heat should be frequently tested by occasionally touching the heated nozzle with a strip of solder. When the nozzle is sufficiently hot at all points to melt solder it is evidence that the sleeve of solder has melted and run to its place, forming a solid joint. Continue this heat for one minute, giving the solder ample time to unite thoroughly with the other metals. The strip of insulating tape may then be removed and the operation is complete.



SELF-SOLDERING NOZZLE AFTER JOINT IS FORMED.

If ordinary care is used there can be no injury to the cable sheath, as solder melts at a much lower degree of heat than will melt the lead sheath of the cable.

It is claimed that the self-soldering nozzle is most convenient where two nozzles enter the head, as it is difficult to "wipe" two joints side by side and close together.

FALLER SEMI-AUTOMATIC SYSTEM.

From a letter received from the Faller Automatic Telephone Exchange Company, New York, under date of Oct. 22, 1903, we quote the following:

The Faller semi-automatic system was devised to meet the wants of telephone companies who are already supplied with manual multiple switchboards which they cannot afford to throw away while their financial and commercial positions are such that they are forced to look for some means of considerably reducing the cost of operation, as well as of giving greatly improved service to their subscribers without discarding the switchboards they are using at present. In regard to this semi-automatic system we have to say:

First—There are no multiples.

Second—It is very much in the nature of a transfer board, but without the delays incident to that form of apparatus when worked by the human operator.

Third—There is no communication between the operators themselves nor the operator and the subscriber.

Fourth—The system does not require any changes from one capacity to another because the units of apparatus in a small exchange are identical with those of a large exchange.

Fifth—The system can be installed gradually without interfering with the present equipment.

The benefits to the operating companies using this system will be:

First—They will utilize their multiple manual switchboards to give the best and swiftest automatic service.

Second—They will make a large economy in the cost of operating.

Third—They will save a large surplus of their present apparatus, which they can use for increasing the number of lines in their present exchanges or for putting in new ones.

Take first as an example an exchange of two thousand lines; such an exchange would have ten multiples, or sections, in each of which all the subscribers' lines in the exchange would be represented; that is to say, they would be represented ten times over. Such an exchange would therefore have ten times two thousand, that is twenty thousand jacks, and two thousand answering jacks, twenty-two thousand in all.

If this exchange had the Faller semi-automatic apparatus added to it, four thousand only of these jacks would be required to do the whole work which had been done by the exchange, and the remaining eighteen thousand jacks would be at the command of the company for any purpose it might require.

In the same manner, the number of relays would be reduced one-half. Wherever the present system requires two relays to each subscriber's line, the Faller system will require only one.

You can easily see that the work to be done by the operators in a semi-automatic exchange of this kind will be very much less than that which they now have to do in the multiple system, as there would be no calling, no answering, no looking for numbers on the part of the operator, so that one operator can easily do the work of several. The only work required being to plug immediately on the lighting of a lamp and attend to the keys.

The incomparably better service which would be given by the semi-automatic system can only be realized by experience. The answer to the subscriber is almost instantaneous, at once informing him by one ring that the line is open, or by two rings that the line is busy. There are no mistakes, no conversations of any kind between the subscriber and the exchange, and conversations over the line are absolutely secret.

It is quite apparent that where there are two companies in competition the Faller system will give to the one using it a tremendous advantage over the other, not only in greatly improved service to the subscribers, but in a large decrease in operating expenses.

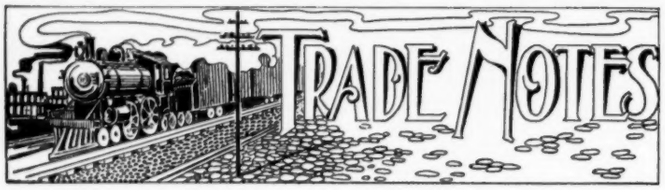
All this is accomplished by the addition of some of the Faller apparatus, at a moderate cost per line, and any number of lines in an exchange may be fitted up with this apparatus and give automatic service to all who are connected with it without interfering with the other subscribers whose lines were not yet fitted up.

We believe that the time is fast approaching when the manual switchboard will be a thing of the past, and we consider that this semi-automatic system is the next step to that end.

This letter is signed by Mr. J. W. Chisholm, president of the Faller company, and is printed in answer to numerous inquiries concerning the semi-automatic now being manufactured by the Faller company.

TELEPHONE LINES AND HOW TO BUILD THEM

The Chicago Telephone Supply Company, Elkhart, Indiana, has recently issued a book on telephone lines and how to build them, which contains a great deal of information of practical value to telephone men. The question of organization is fully covered in the early pages, followed by a model constitution and by-laws with proper forms for petitioning a town or city for a franchise, petition for right of way along public highways, etc. The body of the book is given up to telephone construction, which is carefully written and fully illustrated. The book contains forty pages and is sold for twenty-five cents. To readers of TELEPHONY the book will be sent free upon request, provided this publication is named.



THE STANDARD UNDERGROUND CABLE COMPANY has removed its offices from the Mills Building to larger quarters in the Crossley Building, New Montgomery and Mission streets, San Francisco, Cal.

THE EWING-MERKLE ELECTRIC COMPANY, St. Louis, is particularly fastidious with its printed matter and employ many original illustrations to lend emphasis to trite expressions. The company's trade-mark is very clever.

THE BRIDGEPORT BRASS COMPANY, Bridgeport, Conn., has recently secured some large contracts for phono-electric wire, through the British electrical engineering firm of Maguire & Barcus for use in England and Germany.

THE HARLOE INSULATOR COMPANY, Elmer, N. J., whose general agents are W. H. Frisby & Company, 24 Vesey street, New York, is building a new factory at Hawley, Pa., which will have a capacity of 35,000 insulators daily.

J. H. BUNNELL & COMPANY, New York city, N. Y., is sending out an attractive circular descriptive of the "Beekophone." The instrument is well constructed, with solid back transmitter, double pole receiver, vibrator bell and call button.

THE EMPIRE ELECTRIC SUPPLY COMPANY, 57 West Jackson boulevard, Chicago, reports an increasing demand for its line of apparatus, supplies and specialties. The company invites correspondence from prospective buyers in the telephone field.

THE WYCKOFF PIPE AND CREOSOTING COMPANY, Stamford, Conn., has issued a pamphlet descriptive of creosoted conduits for underground wires and cables, poles and cross arms, railroad ties, bridge timber, piles, paving blocks, fence posts and lumber.

THE CHASE-SHAWMUT COMPANY, formerly with headquarters at Boston, will only retain a branch office in that city hereafter. The company is now permanently located at Newburyport, Mass., maintaining branches in Chicago, New York, Boston and San Francisco.

THE ELECTRICAL APPLIANCE COMPANY, Cincinnati, Ohio, is sending out a number of circulars describing its line of apparatus and supplies. The Churcher system of telephones is illustrated in one of the circulars. The entire set will be sent upon request.

THE STANDARD PROTECTIVE COMPANY, 260 West Broadway, New York, was incorporated under the laws of the state of Maine October 19, 1903, with a capital of $500,000. Object, to operate the Schwarzschild telephone, burglar and fire alarm. Registered agent, the Corporation Trust Company of Maine.

THE FRANKLIN ROLLING MILL AND FOUNDRY COMPANY, Franklin, Pa., which concern is represented in New York by Chas. W. Mackey, Postal Telegraph building, is completing its plant for the manufacture of steel poles for electric light, power, trolley, telephone and telegraph lines, and is making a bid for foreign business. Arrangements have been made with Roger Sons & Company of London to represent the company in Great Britain, while Isaac M. Hutchison, Mexico City, who represents the interests in Mexico of the St. Louis Car Company, will handle the poles there.

THE ACME ELECTRICAL COMPANY, Chicago, has just placed on the market a new improved switchboard drop and jack, a cut of which is shown in its advertisement on page 18 of this issue. This drop is claimed to be the most sensitive and durable on the market, having less parts to get out of order than any other make.

THE MODERN ELECTRIC COMPANY, Burlington, Iowa, devote considerable time and attention to details of circular matter to advance its business. This company displays characteristic Western vigor and maintains cabinet works, iron foundry and warehouses with separate working forces, controlled by the one management.

THE HUBBS-NEER ELECTRICAL MANUFACTURING COMPANY, Butler, Ohio, is figuring on enlarging its plant to about three times its present capacity, in order to keep up with the growth of the sales of its products. The sales of Twentieth Century dry battery alone has increased threefold when compared with sales of last year.

THE ELECTRIC APPLIANCE COMPANY, Chicago, has added two new catalogues to its list. The No. 19 is a telephone catalogue most complete in everything pertaining to telephone work. No. 20 lists the complete general line of electrical supplies, electric light, street railway, construction, etc. An up-to-date price list accompanies each catalogue.

THE EASTERN ARM AND PIN COMPANY, New Bern, N. C., is now equipping another plant to especially manufacture large, special arms for street railway and power line work. Its business in this line, both for domestic and foreign consumption, has grown to such large proportions that it has been obliged to separate it from its general cross arm business.

THE THOS. E. CLARK WIRELESS TELEGRAPH-TELEPHONE COMPANY of Detroit, Mich., has just issued Bulletin No. 9, giving data and facts relative to its apparatus. It also includes an article by Mr. Clark discussing the subject with the aid of diagrams. The apparatus is also shown in detail with cuts. Copies of this pamphlet can be obtained from the company on application.

WILLIAM ROCHE, 42 Vesey street, New York, reports recent receipt of several substantial foreign orders for his standard dry batteries. The more important orders have been secured from London, through the export house of S. Hoffnung & Company, Ltd., 116 Broad street, and for South Africa, China and Australia through Muller, McLean & Company, same address.

THE VIRGINIA LOCUST PIN COMPANY, Bern, N. C., is now operating large plants in three states, Virginia, North Carolina and Tennessee. The product of its factories in northern Virginia is used for making prompt deliveries north and east, that in Tennessee for prompt deliveries west, and that in North Carolina for southern distribution. It has great advantages in the way of freights.

THE AMERICAN ELECTRIC TELEPHONE COMPANY, Chicago, reports having shipped several carloads of central energy switchboard equipment to the Fort Worth Telephone Company, Fort Worth, Texas. It is thought that this is the first large switchboard intended for Independent service where each cord circuit is equipped for four-party selective signaling service—the American company's high and low

frequency selective apparatus having been adopted. In addition to the Fort Worth equipment a 3,000-line capacity switchboard has been shipped to the Kewanee Telephone Company, Kewanee, Ill. This switchboard also is equipped complete with four-party selective keys.

The Ewing Merkle Electric Company, St. Louis, Mo., reports a very large growth in its business, especially in telephone apparatus and supplies. The company's success has been due to its low prices for standard apparatus and supplies and its method of making prompt shipments. It is the youngest supply house, but is becoming a very marked factor in the telephone and electrical field.

The Maltby Lumber Company, Bay City, Mich., for the first time in the history of its pole business, finds its stock running low on certain sizes this fall. This sometimes happens in the spring, before the poles are out of the woods, but is unprecedented at this time of the year. Of course, the scarcity is only temporary and will not affect the filling of orders, but it illustrates the rapid growth of the cedar pole business, even during the supposedly dull season.

The Central Telephone and Electric Company, St. Louis, will shortly issue a souvenir catalogue of its product which will be interspersed with views of World's Fair buildings. These pictures will be reproduced from plates made especially for the Central company and the catalogue promises to be of especial value, aside from its exposition of Central apparatus, to those who contemplate visiting the fair. This company's catalogue No. 16 is one of the finest small booklets of the year.

The Chicago Telephone Supply Company, Elkhart, Ind., has within the last week, according to advice at hand, received the following orders: One 100-line switchboard and 100 telephones for Guaymas, Sonora, Mexico; one 100-line express switchboard, 100 bridging telephones and 100 series telephones for Hermosillo, Sonora, Mexico; one 100-line Chicago express switchboard, accompanied by telephones, tools and some construction material for Chiclayo, Peru, South America.

The Swedish-American Telephone Company, Chicago, has just issued a handsome, up-to-date, twenty-page catalogue. "Use Your Brains" is the cover title, and by means of the engraver's art and high-class printing is shown the complete product of the Swedish-American company in a truly artistic manner. The general appearance of the catalogue is most attractive, the arrangement being in keeping with previous "above the average" publications issued by this enterprising concern.

The Central Electric Company, Chicago, has just issued its November price list and discount sheet, copy of which Telephony desires to acknowledge. It is an exceedingly attractive little book, designed to supplement the 1903 general catalogue. It has been revised to date and contains the very latest prices in force, hence cannot help but be of interest to everyone in the electrical field. Certainly every holder of a catalogue who has not received this price list should write for one.

The Chicago Writing Machine Company has met with the immediate and unqualified favor of telephone companies and manufacturers with its adjustable desk telephone. Arrangements have been made with almost all of the large manufacturers of Independent telephone apparatus in the country to handle the Adjustaphone, which permits the use of any transmitter and receiver. In this way manufacturers and jobbers are furnishing their customers with what is practically their own apparatus, thus insuring that uniformity which is so desirable. Orders have been received from most of the large exchanges and the instruments are reported to be giving perfect satisfaction.

The Ewing-Merkle Electric Company, St. Louis, Mo., is mailing an attractive folder which calls attention to its great facilities for promptly taking care of orders of any magnitude. The illustration is a clever drawing of a young woman in military costume, and impresses forcibly the foreword, "Military Promptness." The company states that its corps of able assistants is at headquarters for its patrons' command, and that each assistant is trained to fulfil his part with care and promptness. Every order will have immediate attention, so that not a moment will be lost. At the head of every department is a lieutenant capable of commanding his special post. All goods are carefully packed, and there is little danger of accident en route. The company will be pleased to send its green-book or special bulletins on request.

The Eureka Electric Company, Genoa and Chicago, has lately furnished new switchboard and telephone equipment for Brownstown Telephone Company, Brownstown, Ind.; East Valley Telephone Company, New Prospect, Wis.; Sidell Telephone Company, Sidell, Ill.; F. W. Gratz, Atwater, Minn.; Tucker Bros., Virden, Ill.; H. & J. Meyer, Cleves, Iowa; Bedford County Telephone Company, Bedford, Pa.; Davenport & Tipton Telephone Company, Tipton, Iowa; Rohret & Cotter, Oxford, Iowa; Gainesboro Telephone Company, Carrolltown, Ga.; W. H. Hargis, Granville, Tenn.; Taylor-Jeardeau Construction Company, Fullerton, Neb.; Wilsonville Telephone Company, Stockport, Iowa; Golden Rod Telephone Company, Cedar Bluffs, Neb.; Equality Independent Rural Telephone Company, Equality, Ill.; D. L. Groce, Willow Springs, Mo.; Elston Telephone and Electric Company, Muscoda, Wis.; Jewell Telephone Company, Jewell, Iowa; Independent Telephone Company, Durham, Mo. The Eureka company is now nicely housed in its new factory at Genoa, Ill. With its increased capacity it is better able to take care of its customers. The company is distributing its No. 23 catalogue, which is one of the finest catalogues published in the telephone business. The company's new bulletins No. 26 and No. 27 are now in press and will be forwarded to any companies interested.

The Stromberg-Carlson Telephone Manufacturing Company, Rochester and Chicago, has recently issued Bulletins No. 6 and 7, which are unique in a number of respects. One of the features is the loose leaf arrangement of the pages and the drawings of the different types of cabinets, which are shown on the page opposite to the half-tone view of the switchboard. A number of standard equipments are shown for the different boards, which experience has shown to be the most in demand. There is included a summary sheet at the back of the book, which ought to be of much assistance to the purchaser in determining what apparatus he wants and at the same time enables the company to make a price on same at a much shorter notice. Attention is called to the manner of coding jacks and keys in the No. 7 bulletin on generator call switchboard parts. This is the first time that anything of this sort has been done, and it will be of much value to the purchaser, as it seems useless to illustrate all the different keys and jacks when they only differ materially in the spring arrangement, the construction of all of them being about the same. Net prices on switchboard parts are given, and the bulletins

contain much information valuable to the exchange manager.

THE THOS. E. CLARK WIRELESS TELEGRAPH-TELEPHONE COMPANY, Detroit and Pontiac, Mich., announce that its business for the fall and winter looks exceedingly encouraging. The company is building apparatus for two stations for government work at Washington and Baltimore and has on hand numerous orders for colleges, universities, high schools and individual sets for short distance work. The company has moved into its new factory located at Pontiac and is preparing instruments to be used at the Universal Exposition at St. Louis, where it will have three stations in constant operation. The company is now looking for students to take up wireless telegraph operating, as it will guarantee a position to every worthy student who by his energy and ambition becomes an expert in the operation of the "Clark" system.

THE SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago, have recently closed contracts for the complete equipment of the following-named companies: South Lyons Telephone Company, South Lyons, Mich.; J. D. Higdon Telephone Company, Kingston, Mo.; Marion Telephone Company, Marion Junction, S. D.; People's Mutual Telephone Company, Sheffield, Iowa; Chariton Telephone Company, Lemonville, Mo.; Laurel Telephone Company, Laurel, Neb., and the Interstate Telephone Company, Elnora, Ind. The Swedish-American company also reports an increasing business and a heavy demand for its selective signaling party line instruments, being an arrangement whereby the central office, as well as the subscribers, can be signaled without ringing the bell of any other instrument on the line. Complete specifications and description will be furnished those interested on receipt of request.

THE F. BISSELL COMPANY, Toledo, Ohio, has made a new departure in catalogue making. Its latest catalogue is of the "loose-sheet" style, which permits the addition of the company's new bulletins and price lists as they are received, and the removal of obsolete ones. The bulletins just put out in this form are bound in a substantial temporary binder of excellent design. When bound in this way the bulletins are as firmly secured and as readily handled as if they were bound in book form after the conventional style. The bulletins cover everything dealt in by the company. It handles electrical supplies and machinery in general, including apparatus and supplies for lighting, power, railways, telephones, dynamos, motors, switchboards, etc. The catalogue is very complete and nothing in the different lines seems to have been omitted in the make up. All the goods listed are illustrated, and a telegraph code enables the purchaser to indicate by this means any particular article. This form of catalogue will no doubt be received with satisfaction by the trade.

THE AMERICAN ELECTRIC TELEPHONE COMPANY, Chicago, send us a list of exchanges which it has recently equipped with apparatus, both of the regular express switchboard, and also of the Bell express type of central office equipment. The following being a partial list of the most recent shipments: Canastota, N. D., 100-line Bell express; Mt. Herob, Wis., 200-line Bell express; Gillespie, Ill., 200-line Bell express; Little Rock, Ark., 200-line express; Mound City, Mo., 100-line express; Wilmont, S. D., 100-line Bell express; Effingham, Kan., 200-line Bell express; Topeka, Kan., 25-line Bell express; Troy, N. C., 100-line Bell express; Frankfort, Kan., 100-line express; Hale, Mo., 200-line Bell express; Fort Riley, Kan., 50-line Bell express; Kingman, Ariz., 150-line express; Trenton, Mo., 100-line express; Chillicothe, Texas, 25-line toll board; Lancaster, Mo., 100-line express; West Point, Ky. (U. S. signal officer), 50-line Bell express; Elmwood, Ill., 320-line Bell express; Mebane, Mo., 8-line toll board; Everest, Kan., 100-line express; Early, Iowa, 200-line Bell express; Le Sueur, Mo., 100-line express; Emporia, Kan., 20-line toll board; Lenox, S. D., 200-line Bell express; Sac City, Iowa, 40-line Bell express; Wakarusa, Texas, 10-line toll board; San Antonia, Texas (U. S. signal officer), 50-line Bell express.

W. H. TRIMM.

Walter H. Trimm is a product of the city of Chicago and has, with some early parental assistance, fought the awful resistance to life in the big metropolis for the past twenty-three years. As a boy he battled successfully with education through grammar and high school, and as a young man he is battling with the Independent telephone industry, having served as a pioneer and in several important positions. For three years he served the Kellogg Switchboard & Supply Company, first in the purchasing department and later as assistant sales manager. Mr. Trimm resigned his position with the Kellogg company, January 1, 1903, and accepted a place with the Monarch Telephone Manufacturing Company as its sales manager—a position he still retains, with credit to the company and to himself. In his present position he will have occasion to call upon the trade, and in order that the trade may become as familiar with Mr. Trimm as it is with other of the Monarch's fixtures and apparatus, we are pleased to offer this rather formal introduction. Like the company he represents you will find Mr. Trimm strictly first-class and subject to the various tests that other meritorious products are subject to.

W. H. TRIMM.

CATALOGUE NUMBER FORTY-TWO.

The latest catalogue of the Chicago Telephone Supply Company, Elkhart, Indiana, has just been issued and is very comprehensive and complete. It contains nearly a hundred pages devoted to the company's complete line of apparatus, and is fully illustrated. A number of new devices are shown, especial attention being given to the company's new switchboards. The catalogue is well worth reading and will be sent to any address postpaid upon request.

NEW AUTOMATIC CATALOGUE.

The Automatic Electric Company, Chicago, has just issued a handsome new catalogue devoted to automatic apparatus. The book is well printed and fully illustrated. The views showing the different factory departments are especially interesting, while the cuts of the apparatus are all good. The catalogue is the most complete one of its kind we have seen and is well worth a careful perusal. The company will send it to interested parties upon request.

A NEW BOOK.

The fourth volume of Arthur Vaughan Abbott's series of books on telephony is out. The present volume deals with the construction of aerial lines and has one hundred and forty illustrations. The entire set is a manual of design, construction and operation of telephone exchanges and is sold for $6.00 (if ordered complete) or $1.50 per volume if ordered singly. The book is from the press of the McGraw Publishing Company, New York, and is a valuable contribution to telephonic art.